PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Vol. 111, No. 20 Thursday, November 14, 1940 Price Ten Cents

Newsprint Profits Dimmed by Higher Taxes

Minimum Excess Profits Tax of 12 Per Cent On All Profits or 75 Per Cent of Amount Exceeding "Standard Profit" Makes Future Returns To Investors Obscure—Hearings On Oxford Land Claims.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., November 11, 1940—While newsprint bonds on the average have advanced in value some 25 per cent from their low point of the year, and while newsprint common stocks have for months supplied the brightest feature of the Stock Exchange, the outlook for investors at present is somewhat obscured. The reason is uncertainty as to how the Excess War Profits Tax will apply to the newsprint industry. This tax provides that all corporations shall pay to the Government a minimum of 12 per cent on all profits, or 75 per cent of the amount exceeding the "Standard profit," whichever is the greater. The standard profit is the average of the four years 1936-1939, with no deduction for any losses during the period. In other words if a company reported a profit in only two of the four years, the base profit in determining the excess profits tax would be the total profit of the two years divided by four.

High Taxes Likely to Curtail Profits

Seeing that the newsprint industry has been doing well this year, the first real recovery after emerging from bankrupt conditions lasting over a long period, it would look as though it would be deprived of most of the profits it has been making, and that a good year therefore will afford little compensation to those whose investments have returned them nothing for years and have in the meantime been sharply written down in value. Conditions like these are provided for in the law instituting the tax, there being a provision by which a claim may be registered on behalf of a depressed industry for special consideration. In the case of such a claim the Minister of National Revenue, or a Board of Referees, may make the profit of a depressed industry for the standard period "commensurate with profits of other like businesses." In allowing this standard or base profit, the statute prohibits the Minister or Board from allowing a profit exceeding 10 per cent on capital.

This provision was the basis of optimistic hopes for fairly generous treatment, but now an official brochure on the Act has been issued which has created misgivings on this point. The brochure defines capital as "assets acquired by purchase on or after the commencement of business, the price at which those assets were acquired and where the price of any asset has been satisfied otherwise than in cash, the then value of the consideration actually given for the assets shall be treated as the price at which the said asset was acquired."

This looks ominous, especially for the junior security holders who picked up newsprint securities at bargain prices. Whether it will prove as ominous as it looks remains to be seen.

Oxford Paper Land Claim Heard

Hearing is proceeding in Halifax, N. S., of a claim for compensation by the Oxford Paper Company for lands taken over by the Government to form part of the Cape Breton National Park. During the week approximately $75,000 was lopped from the claim by the Company's counsel. Now the corporation asks for $2,281,597.92, of which the principal item is $1,469,166.50 for soft and hardwoods in the expropriated area, reduced by 13,000 acres and 40,000 cords from that originally called for by the Government. The case, under way for many weeks, has involved the calling of experts from Maine, New Brunswick and this province, extensive mapping, cruising and other investigations.

Union Bag Gives Testimonial Dinner

[FROM OUR REGULAR CORRESPONDENT]

HUDSON FALLS, N. Y., November 11, 1940—A testimonial dinner was tendered this week by the Union Bag and Paper Company to several officials who are retiring after many years of service. The guests of honor were Reuben H. Winegard, superintendent of the bag factory, 43 years; Joseph Nesbit, superintendent of the printing department, 37 years; George J. Smith, superintendent of the machine shop for the past few years, 47 years, and William Lattimer, foreman in the specialties department, about 40 years. Each was presented with a Gladstone traveling bag and a large number of congratulatory telegrams were received. The affair was attended by 200 persons, including True M. Avery, vice president of the concern.

Paper Mill Additions Nearing Completion

Construction On Large Extension To Finishing Room of Consolidated Power & Paper Mill And New Buildings of Nekoosa-Edwards Nearly Finished—Production Is Higher—Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., November 11, 1940—Construction work is moving rapidly on the large addition to the finishing room of the Consolidated Water Power and Paper Comapny's main mill at Wisconsin Rapids, Wis. It is expected the building will be ready by the first of the year.

The structure is 48 by 260 feet in size and extends south from the present building, adjacent to the new mill office. It will be used for finishing room operations, storage and shipping.

Structural improvements also are being made in the old machine room housing machines Nos. 1 and 2. Alterations are also being made on No. 2 machine to increase its production.

These additional facilities have been made necessary because of the growing demand for Consolidated's Process papers, coated directly on the machines under its patented process. Growth of operations since June, 1935, when the company announced its new product had reached a commercial production basis, has been one of the most significant developments in Wisconsin paper mill history. At about that time "Life" magazine was launched, largely because Consolidated was able to furnish the quantity of coated paper needed both rapidly and cheaply. Demands of the new market made it necessary to embark upon a building program representing an investment of approximately $1,500,000.

Expansion projects within the last five years include a new machine room east of the old one housing the four machines of the Wisconsin Rapids division, to accommodate a specially built new machine for the coating process. The sulphite mill was enlarged to accommodate two additional digesters, increasing the sulphite output 45 tons daily. Bleach plant buildings were also extended and three chlorinators, two new final stage bleachers, additional washers and tanks were installed and three new filter beds added. The new No. 5 paper machine was built to trim 120 inches and produces 70 tons daily. New building space also was added at the Biron, Wis., division, where the machines were converted to the new process. With the present enlargement of the finishing room and the other improvements now under way, the company will be able to speed up its customer service.

Nekoosa-Edwards Addition Nearly Finished

Completion is rapidly nearing on the additions under way at the Nekoosa-Edwards Paper Company, Port Edwards, Wis. These include enlargement of the main office building and the laboratory and engineering office. Included in the plans for the 54 by 40 feet office addition is an air-conditioning unit to be located in the basement. The space will be used largely for sales display and conference rooms, with built-in display cases to show extensive samples of the company's line. Larger quarters also will be possible for the forestry and planning departments. The other addition to the clock house will be 41 by 52 feet, and will provide additional space for the engineering and laboratory departments.

Since the company shifted production over December 1, 1936, to the manufacture of fine writing papers, extensive expenditures have been made to change the paper machines and improve other operations. Its watermarked sulphite bonds and other items are now enjoying an extensive market.

Appleton Coated Paper Output Higher

Annual production of the Appleton Coated Paper Company, Appleton, Wis., now runs from 10,000 to 13,000 tons per year. The number of employees has been increased gradually until there are now 300 on the payroll, with wages of $480,000 annually. Of the $1,250,000 spent on raw materials in 1939, a total of $825,000 is spent largely for paper from Wisconsin mills. The bulk of it, $750,000 worth, comes from the Fox River Valley. The invested capital now amounts to $1,250,000, and the average inventory is $350,000. Among the recent improvements is the installation of a 630-horsepower Diesel engine in a new building, to supplement the steam-powered equipment. A research department is now maintained, with a staff of eight persons occupying a splendidly equipped laboratory.

More Acres Entered for Reforestation

An additional 1,680 acres has been entered by Wood County, Wisconsin, for reforestation purposes under the Wisconsin forest crop law. The area is mostly tax-delinquent lands. This county is the home of the Consolidated Water Power and Paper Company and the Nekoosa-Edwards Paper Company, and the species being planted bear largely in mind the future sources of raw materials for the mills. A total of 2,201 acres has been reforested to date, with 749 acres being planted to pines during the last year. The county expects to add another 2,125 acres to the forest areas in 1941. Considerable planting of Norway and white pine has been done to improve the existing stands of timber.

Baldwin and Houtz Nuptials

Paul C. Baldwin of Swarthmore, Pa., and Miss Margaret Fargo of Kaukauna, Wis., were married Saturday, November 9, in the rectory of St. Thomas' Catholic Church, Wilmington, Del., by the Rev. Michael Jordan. Mr. Baldwin took his undergraduate work at Syracuse University, and received his M.A. and Ph.D. degrees from the Institute of Paper Chemistry, Appleton, Wis. He is associated with the Scott Paper Company, Chester, Pa. His bride was formerly employed on the Institute staff. The couple will reside at Swarthmore.

The marriage of Harold Houtz, Comas, Wash., and Miss Erna Holtz of Appleton, Wis., took place Saturday, November 2, at the First Methodist Church

at Appleton, with the Rev. A. Guenther performing the ceremony. Mr. Houtz is a research chemist at Camas for the Crown-Zellerbach Corporation. He did his undergraduate work at Rensselaer Polytechnic Institute, Troy, N. Y., and received his master's and doctor's degrees from the Institute of Paper Chemistry, Appleton, Wis. His bride has been employed at the Institute for the last four years. The couple left for Niagara Falls, N. Y., on a honeymoon trip to visit Mr. Houtz's parents, who reside there, and then will go to Camas to reside.

Traffic Executives Give Annual Dinner

Traffic executives of various paper mills will be among the 200 attending the fourth annual dinner of the Fox River Valley Traffic Club at The American Legion clubhouse at Oshkosh, Wis., Tuesday evening, November 12. L. O. Schubart, treasurer of the Neenah Paper Company, Neenah, Wis., will be the toastmaster, and R. C. Thorne of Menasha, Wis., the retiring president, will preside. Mr. Schubart was recently elected fourth vice-president. Arthur Schroeder of Oshkosh, Wis., is the president-elect. The speaker will be G. H. Ostermann of Detroit, Mich., traffic director of the Timken Detroit Axle Company. His subject will be "Traffic as it Affects the Shipper."

Miss Gilbert's Engagement Announced

Mr. and Mrs. A. C. Gilbert, Neenah, Wis., announced the engagement last week of their daughter, Priscilla, to Thomas C. Catlin, son of Mr. and Mrs. Mark Catlin, Appleton, Wis. Mr. Catlin has been a student at the University of Wisconsin. Mr. Gilbert is president of the Gilbert Paper Company, Menasha, Wis. The wedding will take place in January.

Bagley & Sewall Doing Well

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., November 11, 1940—Announcement is made by the Bagley & Sewall Company that excellent business conditions have been experienced during the first nine months of the year. Among the most important contracts handled was the building of a new 144-inch all welded steel construction Fourdrinier facial machine for the manufacture of tissue papers; the rebuilding of one 104-inch six cylinder board machine, furnishing complete new wet-end equipment and entirely reconditioning the remainder of the equipment for an Australian concern; rebuilding a 120-inch Fourdrinier machine for the manufacture of cigaret papers, the job including furnishing a new Fourdrinier and new press besides widening the machine from 120 to 125 inches; furnishing a complete ground wood mill in Brazil with grinders, deckles, screens, wet machines, pumps and motors; rebuilding a 72-inch news machine for South America and rebuilding a 90-inch machine for the manufacture of fine writing papers; rebuilding a 120-inch Fourdrinier and increasing its speed from 50 feet per minute production to 800 feet per minute; furnishing a new size-press, new presses, new drives and new calendars for a book paper machine; rebuilding a 100-inch Harper machine for manufacture of lightweight tissue papers, supplying a complete set of hypoid drives and the making of a new Fourdrinier, changing the press, providing a new reel, new winder, new screens and other factors of a machine used in producing roofing papers.

Paper Section Appoints Committees

The following are the new officers and committee members of the Pulp and Paper Section of the National Safety Council:

GENERAL CHAIRMAN—D. B. Chant, Ontario Pulp and Paper Makers' Safety Association, Toronto, Ont., Canada.

VICE-CHAIRMAN IN CHARGE OF MEMBERSHIP—Clayton O. Braatz, Marathon Paper Mills Company, Rothschild, Wis.

SECRETARY AND PROGRAM COMMITTEE CHAIRMAN—Roland W. Richardson, the Gardner-Richardson Company, Lockland, Ohio.

NEWS LETTER EDITOR—J. F. Berry, Alton Box Board Company, Alton, Ill.

CONTEST COMMITTEE—A. Scott Dowd (Chairman), Fritz Publications, Inc., Chicago, Ill.; B. D. Rogers, Bird & Son, Inc., East Walpole, Mass.; F. H. Rosebush, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

DATA SHEET COMMITTEE—R. G. McGivney (Chairman), Oswego Falls Corporation, Fulton, N. Y.; D. C. Brown, Strathmore Paper Company, West Springfield, Mass.; J. J. Hastings, Port Huron Sulphite and Paper Company, Port Huron, Mich.; D. T. Meany, New Brunswick International Paper Company, Dalhousie, N. B., Canada; B. J. McClosky, Hoberg Paper Mills, Green Bay, Wis.; W. B. Place, Kieckhefer Container Company, Delair, N. J.; James W. Towsen, West Virginia Pulp and Paper Company, New York, N. Y.

ENGINEERING—SAFE PRACTICES COMMITTEE—Julius A. Draper (Chairman), Consolidated Paper Corporation, Ltd., Grand'Mere, P. Q., Canada; M. W. Dundore, Beloit Iron Works, Beloit, Wis.; James J. Hanks, American Paper and Pulp Association, New York, N. Y.; C. O. Holmer, Minnesota & Ontario Paper Company, Minneapolis, Minn.; D. A. McAlary, Fraser Companies, Ltd., Edmundston, N. B., Canada; E. A. Page, Kimberly-Clark Corporation, Neenah, Wis.; G. R. Vaughan-Evans, Anglo-Newfoundland Development Company, Ltd., Grand Falls, Newfoundland.

HEALTH COMMITTEE CHAIRMAN—Dr. Louis H. Frechtling, Champion Paper and Fibre Company, Hamilton, Ohio.

STATISTICS COMMITTEE CHAIRMAN—Fred W. Braun, Employers Mutuals, Wausau, Wis.

PUBLICITY COMMITTEE—Walter E. Strong (Chairman), Menasha Products Division, Marathon Paper Mills Company, Menasha, Wis.; R. P. Almour, Fibreboard Products, Inc., Los Angeles, Cal.; J. C. Fitzgerald, Bowater's Newfoundland Pulp and Paper, Ltd., Corner Brook, Newfoundland; O. R. Hartwig, Crown Zellerbach Corporation, Portland, Ore.

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Two New Export Cartels Formed

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., November 13, 1940—Two new export cartels have been organized by Finnish, Norwegian, and Swedish mills manufacturing cardboard and high grade papers, according to a cable from the office of American Consul, Stockholm. In addition to promoting exports, the new organizations, to be known as Scanpapp & Scanfin, will allocate orders and control production and prices.

Trend in Demand for Paper Headed Upward

Sulphite and Groundwood Papers More Active With Better Demand For Kraft Paper Reported In Midwest Territory — Paper Milk Containers Popular—Paper Associations Meet—Other News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., November 11, 1940—More seasonal weather and more attention to business and less to politics provided an additional spur to the paper industry locally during the past three or four days. Likewise, government suggestions as to an increase of debt limitations with the earmarks of inflation sooner or later to come, provided local paper commentators with further reasons as to strengthening of the market. As yet the industry here sticks to its somewhat narrow condition of comparatively slow demand and the specter of raw material shortages and high production costs not yet heavy enough to cause an upward trend. But there is a growing evidence of the market moving upward during the remaining fall months. According to local reports groundwoods began to show more strength and sulphites also indicated more general activity. Books and covers found more action in business preparations for improved conditions generally in 1941 while bonds and ledgers held to better demand and krafts pulled upward from conditions a few weeks ago. Waste papers remained little changed with the majority of the lines showing fair strength.

Paper Milk Containers Popular

The paper industry will be gratified to learn that paper containers are becoming very popular with milk users in this area. Since the ban on containers was lifted by Federal Judge Woodward who enjoined the city from interfering in such sales, more than one fourth of the 800,000 quarts of milk sold in Chicago retail stores each day goes out in paper containers according to estimates by dairy executives and union officials. Sales of the Fieldcrest Dairy, which carried the litigation load, are reported to have doubled since the injunction was granted. A survey has indicated that the public is taking to the cartons and food and delicatessen store owners have evidenced surprise at the demand. Most of the customers are reported as happy that they can avoid the trouble of the glass bottle and the payment of the deposit on them. Paper and allied industries feel that the publicity given the use of paper cartons in this area has been invaluable in widely increasing demand for paper products.

Chicago Paper Association Meets

The Chicago Paper Association, of which H. W. Borchardt of Pilcher-Hamilton Company is president, will hold its next meeting on November 12. Two new members have been reported, the Kirchheimer Brothers Company and the J. J. Lipp Paper Company.

Sales Tax Ruling Revised

Of interest to that part of the paper industry selling wallpaper and paper for use in building and road improvement is the revision of rule 6 of the Retailers Occupation tax which removes sales tax liability on sales of paper to contractors and sub-contractors. Effective November 1 but available for information purposes on November 7 is the rule which states that "persons who sell materials to contractors or subcontractors for use by them in the construction, erection or repair of buildings, foundations, roads or other improvements shall not from November 1, 1940, be liable with respect to their gross receipts from the sale of such materials. Contractors and subcontractors to whom such materials are sold are not subject to the tax with respect to their receipts from labor and materials furnished by them under contracts to improve real estate. Materials "include paper, wall board and wall paper and weather stripping."

Advertise Hopper Paper Product

Through the courtesy of the McIntosh Paper Company, 111 N. Canal street, Chicago, advertising users have received a very attractive folder carrying, within its twelve loose leaf pages, remarkable color photographs depicting air travel service. The folder is designed to portray the use of offset work for color effects and the qualities of paper manufactured by the Hopper Paper Company of Taylorville, Illinois. The cover of the mailing is of Brightwell Offset, 25 x 38, 400 pound two ply. The color illustrations are on 25 x 38 300 pound two ply stipple stucco Brightwell offset. The "ingredients" of the attractive presentation are contained in an adequate foreword on the first page.

Book and Kraft Paper Men Meet

Chicago again becomes the paper capital of the country next week when various groups meet to discuss their problems. The Book Paper Manufacturers Association will hold a general meeting at the Palmer House on November 14 while the Kraft Paper Association will hold a general meeting of the industry on November 13 and 14. Preceding these meetings will be a regional meeting of the National Paper Trade Association to be held at the Stevens Hotel on November 12. Merchants from Illinois and surrounding western States are expected to attend this meeting where many topics of extreme importance will be up for discussion. Markets, sales contracts, the certification program and compensation for salesmen are among the subjects while recent discussions on a forty hour week and on Saturday closing which have taken place on a national basis are considered certain to find themselves on the agenda for the regional conference in this city.

Hill Make Divisional Manager

O. K. Hill has recently been appointed divisional sales manager for the midwestern states of Better Packages, Incorporated. The company makes machines for dispensing gummed sealing tape. Mr. Hill, who has been associated with Better Packages for fourteen years, will make his headquarters in the Chicago office, spending the greater part of his time in contacting the regional offices.

Commission Holds First Abitibi Hearing

First Phase of Investigation of Abitibi Pulp & Paper Co. Affairs Summarizes Nature and Extent of Company's Assets In Properties and Operations — Inquiry To Continue Daily Until November 1.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., November 11, 1940—The first week's sessions of the Royal Commission investigating the affairs of the gigantic Abitibi Pulp and Paper Company, covered two phases of the investigation. The first phase was something in the nature of an historical resume of the company's vast holdings and properties and the financial set up in control. The second phase embraced the details of the multitudinous plans for reorganization and getting the enterprise out of receivership. The sessions, which are being held in the Ontario legislative chambers, are expected to continue daily until November 18, when there will be a recess to enable Mr. Justice Charles P. McTague, chairman of the commission, to attend other duties in Ottawa, and then resume for an unpredictable period.

Abitibi Receiver Outlines Its Activities

G. T. Clarkson, receiver for Abitibi, was the first witness at the opening session on Monday morning and outlined the nature and extent of the various enterprises and properties making up the corporation known as Abitibi Pulp and Paper Company, which include Abitibi Electric Development Company at Island Falls, the Kaministiqua Power Company at Kakabeka Falls, Mattagami Railroad, linking Smoothrock Falls to the Canadian National Railways system and the G. H. Mead Company, Abitibi sales agent in the United States. The company also owns or controls mills at Beaupre, Que.; Pine Falls, Man.; Sault Ste. Marie, Iroquois Falls, Smoothrock Falls, Espanola, Thorold, Georgetown, Mille Roche, Fort William and Port Arthur, Ont. The company makes groundwood pulp, news sulphite pulp, high grade bleached sulphite pulp, fine papers and many other paper products. Minor subsidiaries include a drug company and improvement companies. The last subsidiary formed was the Abitibi Navigation Company.

Much testimony was submitted respecting terms of water power leases, the power developed at the various plants, water levels, contracts, sources of supply, limits, cutting rights, etc.

Referring to the recent action of the Ontario government in giving lumber companies the right to cut saw-logs 11 inches and over at the butt on timber rights held by the pulpwood companies, Mr. Clarkson maintained that this would reduce Abitibi potential pulpwood supplies in the area granted the Great Lakes Lumber Company by about 45 per cent. Strachan Johnson, representing Montreal Trust Company, read an agreement which, he said, showed plainly no other company but Abitibi had been contemplated as operating in that particular area. "Great Lakes Lumber Company has been given the right to come in and eviscerate us," he said.

Resuming, Mr. Clarkson said that prices of newsprint has risen at one time to $111 a ton. Production increased, but demand dropped and paper brought only $40 a ton in 1933. Demand increased again in later years, but the price remained at $40. In 1936 Ontario and Quebec inaugurated the pro-rating system because of excess capacity. In 1937 interlocking contracts lapsed and the prices were increased to $50. Demands were so great customers could not get paper. Publishers tried to get all the paper they could before prices rose again, but the "boom" faded out. Since the war, Scandinavian supplies had been cut off and demand increased again. The price is $50 a ton now "and no one can forsee what is to come," he said. Abitibi's assets, according to Mr. Clarkson, as of Dec. 31, 1939, amount to $121,000,000.

Net Valuation Set at $49,704,000

Net sound valuation, as determined by the New York firm of Coverdale and Colpitts in 1936, G. T. Clarkson told the commission, was set at $49,704,000. The replacement figure of the company's properties was $71,436,000, while depreciation and maintenance was set at $21,731,000. Mr. Clarkson also gave the valuation of the various mills.

Mr. Clarkson was asked by the commission to submit his own plan for re-organization, sale and other disposal of the assets of the vast industrial concern. "We of the commission would feel considerably in your debt if you were to prepare, as receiver, plans for the re-organization of Abitibi," Mr. Justice McTague, chairman, said. "If a plan can be devised and reasonably concurred in, it is always possible suitable legislation might be enacted to accomplish it," he said.

Mr. Clarkson said that "If the bondholders were willing to accept less than their full legal rights; if they are willing to take anything less than their claim, then there are certain suggestions which can be made."

Mr. Clarkson said further that if the majority of shareholders refused to acquiesce in any plan, under the Judicature act they could defeat it.

Because of improvements in equipment, the Abitibi firm is now in a better competitive position than ever before, Mr. Clarkson told the commission. Capacity of the paper mills had been stepped up from 550,000 tons of paper per year to 590,000 tons. War conditions had increased the demand for wood pulp, sulphite and similar products, he declared, although the demand had slackened a little in recent months.

Abitibi Shareholders Nearly 10,000

Nearly 10,000 persons hold shares in Abitibi, R. S. Macpherson, liquidator, told the commission. There are 189 holders of seven per cent preferred stock, located mostly in Canada, he said. Six per cent preferred stock is held by 3,931 persons in Canada or England, 630 in the United States, 31 in Europe and nine in other countries. Most of the common stock is held in Canada or England, 4,436 of the holders living there. In the United States, 1,179 people held the stock; 57 in Europe and 11 in other countries. Total common shareholders was 5,683, he explained. The company had 725 trade creditors, Mr. Macpherson said.

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FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending November 13, 1940

	High	Low	Last
A. P. W.	2½	2¼	2½
Armstrong Cork Co.	33½	31¼	31¾
Celotex Corp.	7⅜	6⅞	7¼
Celotex Corp., pf.	63	62	63
Certain-Teed Products Corp.	5¼	5	5⅛
Certain-Teed Products Corp., pf.	32½	30	32½
Champion Paper & Fibre Co.	23¾	22¾	23¾
Champion Paper & Fibre Co., pf.	105	102	105
Congoleum-Nairn Co.	21¾	19½	19½
Container Corp. of America	17⅜	16	17
Continental-Diamond Fibre Co.	8⅞	7¾	8⅛
Crown-Zellerbach Co.	16¾	15⅛	16¾
Crown-Zellerbach Co. pf.	91	89¾	90
Flintkote Co.	17½	16½	16¾
Robert Gair	3⅛	2⅝	3⅛
Robert Gair, pf.	17⅛	16	17
International Paper & Power	17⅜	14⅜	17¼
International Paper & Power, pf.	69½	61⅜	69
Johns-Manville Corp.	66	63	65
Johns-Manville Corp., pf.	....	....	....
Kimberly Clark Corp.	39	37¼	39
MacAndrews & Forbes	31	31	31
MacAndrews & Forbes, pf.	131	131	131
Masonite Corp.	30¾	30	30
Mead Corp.	10¾	9⅜	10⅝
Mead Corp., pf.	75	75	75
Paraffine Companies, Inc.	....	....	....
Paraffine Compaines, Inc., pf.	....	....	....
Rayonier, Inc.	18⅝	16	18½
Rayonier, Inc., pf.	27½	26⅝	27½
Ruberoid Co.	17⅜	16½	16¾
Scott Paper Co.	42	41	41
Scott Paper Co., pf.	....	....	....
Sutherland Paper Co.	23¾	23⅛	23⅛
Union Bag & Paper Corp.	14⅛	12	14⅛
United Paperboard Co.	4½	3⅞	4½
U. S. Gypsum Co.	72½	67½	71½
U. S. Gypsum Co., pf.	174	172½	172½

New York Curb Exchange

High, Low and Last for Week Ending November 13, 1940

	High	Low	Last
American Box Board Co.	4⅞	4⅞	4⅞
Brown Co., pf.	20	18½	20
Great Northern Paper	44	42	44
Hummel-Ross Fibre Corp.	7⅛	6½	7⅛
National Container Corp.	12½	11⅛	12½
St. Regis Paper Co.	3⅛	2⅝	3⅛
St. Regis Paper Co. pf.	75¾	69¾	75¼
Taggart Corp.	4¼	3⅜	4¼

Union Bag Makes Good Report

Net profit of the Union Bag and Paper Corporation for the nine months ended September 30, 1940, amounted to $2,315,167, equivalent to $1.83 a share on the 1,265,329 shares of capital stock outstanding, after all charges including Federal income tax at the rate of 24 per cent as required by the Second Revenue Act of 1940, but before excess profits tax. This compares with net earnings of $440,051 for the first nine months of 1939, equal to 35 cents a share on 1,262,729 shares outstanding at the end of that period.

"In order to ascertain the correct amount of invested capital of this company for the purpose of calculating the excess profits tax applying to the profits for this year, the financial records for many years past must be analyzed," Alexander Calder, president of Union Bag stated in his report to stockholders. "Until this work is completed the precise amount of these taxes cannot be known definitely. Meanwhile, we estimate that the excess profits tax for the nine months ending September 30, 1940, will result in reduction of the profits for this period by approximately $530,000."

After applying the 24 per cent Federal income tax rate for the period, net profit for the third quarter of 1940 amounted to $808,663 or 64 cents a share, against $867,273 or 69 cents a share for the quarter ended June 30, 1940, after deducting tax at the rate of 20.9 per cent then in effect, and $207,686 or 16 cents a share for the quarter ended September 30, 1939, after deducting tax at the rate of 19 per cent. Sales for the third quarter of 1940 amounted to $5,565,610, compared with $5,653,483 for the quarter ended June 30, 1940, and with $5,009,998 for the quarter ended September 30, 1939. For the first nine months of 1940 sales totaled $16,051,859 against $12,488,922 for the similar period last year.

For the twelve months ended September 30, 1940, net profit of the corporation was $2,840,849 or $2.25 per share after deducting Federal income tax at rates applicable to the respective portions of that period, compared with $579,439 or 46 cents a share for the twelve months ended September 30, 1939. Sales for the same periods amounted to $21,124,903 and $16,887,751, respectively.

Commenting on the company's dividend payments this year, Mr. Calder said: "On September 16 a dividend of 25 cents per share was paid which was an increase from the two dividends of 15 cents each paid earlier in the year. Profits for the year to date indicate that a further increase in the dividend for payment in December is likely."

M. & O. Paper Nets $13,256,508

Net sales of the Minnesota & Ontario Paper Company and subsidiary companies for the first nine months of 1940 were $13,256,508.02, or $2,544,814.38 larger than for the corresponding period of 1939, says the trustees' 25th report of operations submitted to U. S. District Court on Oct. 31. The company maintains headquarters in Minneapolis, with plants at International Falls, Minn., and in Fort Frances and Kenora, Canada.

Net profits on sales for the nine months ending Oct. 31 were $1,849,876.88, as compared with $608,245.53 for the same period in 1939.

"Deficient rainfall in this area has continued throughout the summer and early fall," says the report, "and, on top of the deficient snow mosture of last winter, has resulted in a power shortage. A comprehensive survey of this situation is being undertaken to determine the availability of additional power to guard against the recurrence of this situation."

The shortage of power at International Falls, states the report, also has restricted the production of Insulite, and resulted in a considerable reduction in the Insulite inventory. This product is manufactured by the Insulite Company, a Minnesota & Ontario Paper Company subsidiary.

U. S. Gypsum Profits Off

The report of the United States Gypsum Company and its subsidiaries, issued November 7, for the nine months ended September 30, showed a net income of $5,250,240 after depletion, depreciation, taxes including $1,587,756 of additional Federal income taxes and excess profits taxes. After dividend requirements

on the preferred, the income is equal to $4.05 a share on 1,194,960 common shares. It compares with $5,730,861, or $4.46 a common share, for the first nine months of 1939.

Net income for the third quarter this year was $1,713,781 after Federal income taxes and after $957,358 charge for excess profits tax and Federal income tax applicable to the third quarter this year and after a charge of $437,558 for excess profits tax and additional Federal income tax applicable to the six months ended on June 30. After allowing for preferred dividends, the net is equivalent to $1.32 a common share. The net income for the corresponding three months of 1939 was $2,151,339, or $1.68 a share.

In figuring its excess profits taxes the company found the 8 per cent return on invested capital the most advantageous to use. Instead of taking a full year's exemption before calculating the excess profits tax, the company figured it on a monthly accrual basis, allowing a two-thirds of 1 per cent exemption for each month.

Lily-Tulip Cup Profits Up

The Lily-Tulip Cup Corporation and subsidiaries for the twelve months to September 30 reports a net profit after provision for excess profits tax, $595,787, equal to $3.14 each on 189,539 shares of capital stock. Net profit for preceding twelve months was $467,675 after deduction for loss due to hurricane on September 21, 1938.

National Paper & Type Nets $2.34

The National Paper and Type Company and subsidiaries, for the year ended August 31, reports a net income of $188,029 after taxes and charges, equal after preferred dividends to $2.34 a share on 64,392 common shares, compared with $74,611, equal to 58 cents a share in preceding year.

M. & O. Paper Earns $1,849,877

The Minnesota and Ontario Paper Company for the nine months to October 31 reports a net profit of $1,849,877, according to report to United States District Court in Minneapolis. Net profit last year was $608,245. Net sales were $13,256,509, or $2,544,814 more than in same period last year.

Nekoosa-Edwards Nets $2.32

The Nekoosa-Edwards Paper Company for the September quarter reports a net income of $146,304, equal to $2.32 each on 62,956 shares, against $194,474, or $3.10 each on 62,831 shares, in June quarter, and $90,553, or $1.44 a share, on 62,706 shares in March quarter this year.

To Speak on Certification Program

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., November 11, 1940—At a dinner meeting of the New England Paper Merchants Association, to be held December 4 at the Parker House, Robert H. Ziegler, assistant secretary of the National Paper Trade Association of the United States, is to explain more about the Certification Program.

National Container Earnings Rise

The National Container Corporation reports for the nine months ended September 30, 1940, net income of $834,541, or $2.52 a common share, as compared with a net income of $159,744, or 48 cents a common share for the nine months ended September 30, 1939. For the quarter ended September 30, 1940, net income was $271,670, or 82 cents a share, against a net income of $71,798, or 22 cents a share for the same 1939 quarter. Net income for the nine months and quarter ended September 30, 1940, is before additional Federal taxes called for by the second revenue act of 1940.

Canadian Profits Tax Obscure

TORONTO, Ont., November 11, 1940—The uncertainty concerning the excess profits tax as applied to the pulp and paper industry, which, no doubt, R. S. Macpherson, liquidator, had in mind when he told the Royal Commission investigating the affairs of the Abitibi Pulp and Paper Company, he wanted more time to give further study to possible taxes, may soon be lifted, according to a message from Ottawa this week.

Announcement is made by Revenue Minister Gibson that there has been appointed a board of referees under the Excess Profits Tax Act. The board consists of: Messrs. Justice W. H. Harrison of the supreme court of New Brunswick, chairman; Charles P. Fell, investment dealer, Toronto; and Kenneth W. Dalglish, chartered accountant, Montreal.

The function of the board is to advise and assist the minister in determining a fair rate of standard profits for corporations taxable under the Excess Profits Tax Act passed at the last session of parliament. Profits over the standard profits become taxable under the act. The standard profits cannot exceed 10 per cent. The excess profits tax applies to businesses with profits of more than $5,000 subject to certain exceptions. It is a levy of either 12 per cent on the whole net profit, or 75 per cent on the excess profit above the standard profit after deducting income tax paid on the excess, whichever is the greater.

Normally, the standard profit is the average profit made by the concern taxed over the past four years. In cases where the profits so earned are abnormally low or where there was no profit at all the minister may fix a fair rate for the standard profit. The board of referees will investigate such cases referred to it by the minister and recommend what standard profit should be allowed.

Buy Paper Under Walsh-Healey Act

WASHINGTON, D. C., November 13, 1940—During the week ended October 26, the Government purchased $96,306.13 worth of paper and allied products under the Walsh-Healey Act as follows: Stanford Paper Company, Washington, D. C., $24,761.10 worth of bond paper for Government Printing Office; the Mudge Paper Company, Baltimore, Md., $11,314.28 worth of bond paper for Government Printing Office; Kieckhefer Container Company, Camden, N. J., $16,058.75 worth of boxes for Navy Purchasing Office; Sigfried Olsen Shipping Company, San Francisco, Calif., $16,368.00 worth of fiberboard for Panama Canal; and Improved Mailing Case Company, Brooklyn, N. Y., $27,804.00 worth of fibre containers for War, Ordnance.

Obituary

Charles L. Allen

Charles L. Allen, chairman of the Norton Company, Worcester, Mass., and its general manager for 48 years, died November 4 at his home in Worcester at the age of 82.

Mr. Allen was a native of Worcester and was graduated from the city high school in 1876. He began his business career as a clerk in a shoe store, resigning to enter the office of the Boston & Maine Railroad. In 1881 he entered the employ of the F. B. Norton Company, manufacturer of pottery, as a bookkeeper. There was developed the first grinding wheel which has become a large business employing 6,000 persons. The Norton Emery Wheel Company was organized in 1885 and Mr. Allen was made general manager, which position he held until 1933.

Mr. Allen became secretary and director of the company in 1892 and in July, 1912, its treasurer. When the Norton Company, formerly the Norton Emery Wheel Company, were merged in 1919, he was elected president and general manager of the Norton Company. In 1933, retiring from active administrative affairs, he became chairman of the board of directors.

Mr. Allen was the dean of Worcester industrialists, one of the founders of the now Worcester County Trust Company. He was a life member of the board of trustees of the Worcester Polytechnic Institute and had been prominent and active in civic affairs for many years.

Surviving are his daughter Miss Mary Norton Allen, a sister Miss Grace G. Allen and a brother, Rufus O. Allen.

Funeral services were held at the First Unitarian Church.

George Tait

GLENS FALLS, N. Y., November 11, 1940—George Tait, former president of the Imperial Paper and Color Corporation, died this week at his home after an extended illness. He was 79 years old. He went to Buffalo in 1892 and became associated with M. H. Birge & Company, wallpaper manufacturers. Later he became president of the Ithaca Wallpaper Company, of Ithaca, and in 1903 was brought to this city by the late George R. Finch as general manager of the Imperial Wallpaper Company, of which he subsequently became president. In 1921 the Tait Paper and Color Industries was organized with Mr. Tait as president but he retired in 1928. During his active career he had served as a director of many companies, including the Associated Industries of New York State, the Utica Mutual Insurance Co., and had been vice president of the Sandy Hill National Bank. He is survived by a daughter.

W. C. Hurley

KALAMAZOO, Mich., November 11, 1940—W. C. "Bill" Hurley, traveling representative for H. Waterbury and Son Felt Company, died suddenly at his farm home near Bronson, Michigan, on November 5, 1940. Born in Coldwater, Michigan, May 12, 1882, Mr. Hurley made that city his home until three years ago, when he moved to his farm. His outstanding personality and genial disposition made his friends legion both in the industry and out. Funeral services conducted by the Knights Templar, were held in Coldwater with a large number of representatives of the paper industry present. Surviving him are the widow and a daughter, Betty of Detroit.

Garson Studley

Garson Studley, a paper manufacturer, died today at his home, 20 Margaret Avenue, Lawrence, L. I., N. Y., after a long illness at the age of 65. He leaves a widow, the former Hattie Baer; a daughter, Maxine Kassel; two sons, Albert and Lester, and a brother, Leo J. Studley.

Lucius Boswell

Lucius P. Boswell, 66, of 432 Otterbein avenue, Dayton, Ohio, secretary and general manager of the Aetna Paper Company, 115 Columbia street, died at 2:30 a.m. Wednesday at the Miami Valley hospital, where he was admitted October 23.

Mr. Boswell had been connected with the Aetna Paper Company for the past 31 years. Surviving are the widow, Clara M. Boswell, and one daughter, Mrs. Orba L. Marshall of Dayton.

Frank Waldo with Columbia Alkali

W. I. Galliher, director of sales of The Columbia Alkali Corporation, division of Pittsburgh Plate Glass Company, announced on November 6 that Frank Waldo will become associated with the Corporation as a member of the technical service department, in the capacity of market research specialist.

Mr. Waldo was born at Sea Cliff, Long Island, N. Y. He attended Staten Island Academy and the Bordentown Military Institute. For eighteen years he was a member of the firm of E. M. & F. Waldo, importers and dealers in colors and pigments, during which time he did extensive survey work on several nationally distributed products. He later became secretary-treasurer of the Stevens Yarn Company, New York, cotton yarn merchants.

He attended the Second Plattsburg Camp in 1917. He was commissioned in the Field Artillery and detached to serve as Assistant Military Attaché, Military Legation, The Hague, Holland, on important assignments.

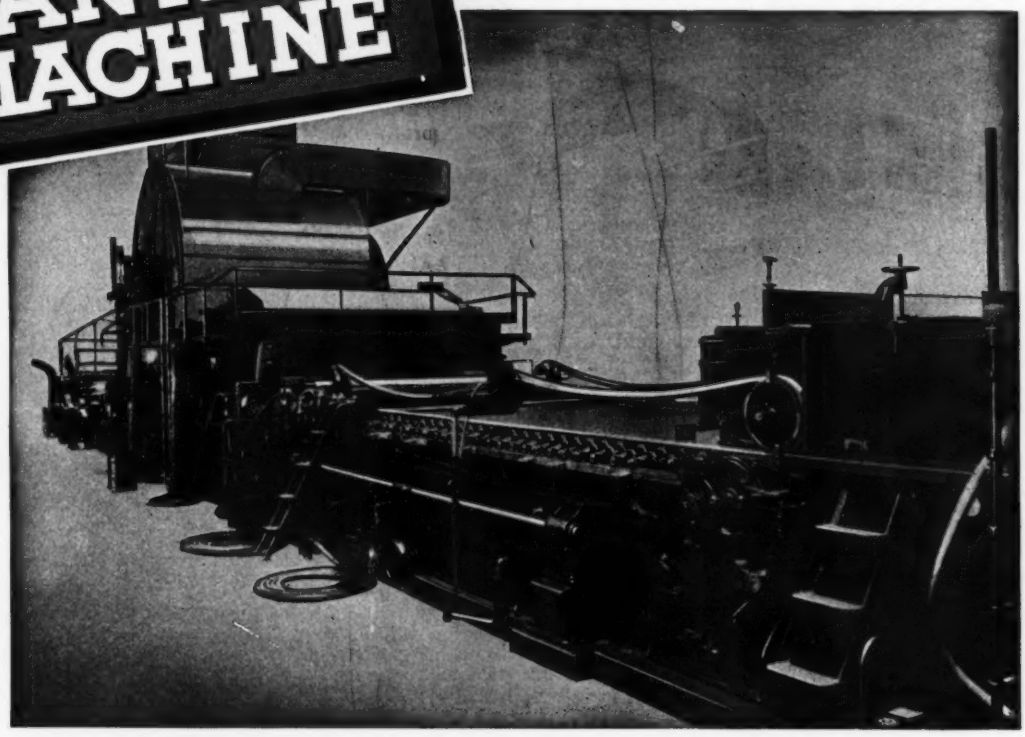
Mr. Waldo has been active in the New York Paint, Oil and Varnish Club for several years and served on many of its committees. He was also active in the National Paint, Oil and Varnish Association, serving as its Treasurer and member of the Executive Committee.

Johnson Heads Reichhold Office

On November 1, Oscar F. Johnson joined the sales organization of Reichhold Chemicals, Inc., Detroit, Mich., in the capacity of district manager of their Chicago territory.

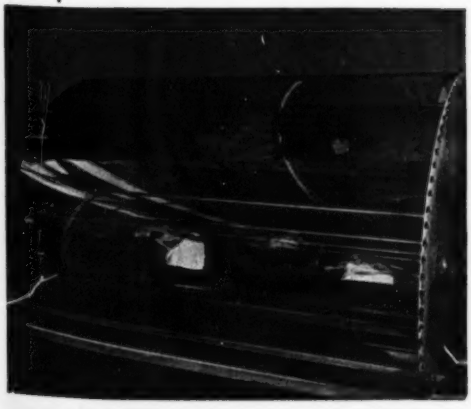
Mr. Johnson, as is generally known throughout the Chicago area, has contacted the paint, varnish and printing ink trade in that part of the country for some twenty-odd years, during most of which time he sold and serviced RCI products through a former affiliation with the S. H. Stewart Company, manufacturers' agents.

THE Beloit YANKEE MACHINE



● The Beloit Yankee Machine furnishes an economical easy means of diversification. No other machine has the all-around adaptability to fit the needs of mills making specialty papers, both light and heavy weights.

The machine is provided with all the latest features: Removable Fourdrinier ...High Speed Super Shake...Suction Rolls...High Pressure Dryer...Hypoid Drive, etc.



Beloit has developed a special alloy metal and special grinding and polishing process to produce the close grained, hard mirror finish shown in this photograph. This is a result of Beloit's many years of experience in building practically all the Yankee machines in this country.

Beloit has also recently developed a high pressure Yankee dryer to meet the demand for maximum production.

THE BELOIT WAY IS THE MODERN WAY

BELOIT IRON WORKS • BELOIT • WIS.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., November 13, 1940—Government Printing Office has received the following bids for 20,475 pounds (150,000 sheets) of 24 x 38 No. 56 white sulphite ledger paper and the 15,600 pounds (100,000 sheets) of same No. 64; Eastern Corporation, 6.75 cents; Stanford Paper Company, 6.09 cents; R. P. Andrews Paper Company, 5.87 cents; Barton, Duer & Koch Paper Company, 6.52 cents; Mathers-Lamm Paper Company, 6.5 cents; Walker-Goulard-Plehn Company, 5.95 cents; Marquette Paper Company, 5.92 cents; Old Dominion Paper Company, 6.9 cents; Whitaker Paper Company, 6.91 cents; Mudge Paper Company, 6.54 cents; and Cauthorne Paper Company, 7.25 cents.

For 10,000 pounds (54,000 sheets) of 100% rag, 28 x 34 white ledger paper; Paper Corporation of U. S., 18.98 cents; Old Dominion Paper Company, 23.89 cents; Cauthorne Paper Company, 19.84 cents; R. P. Andrews Paper Company, 19.83 cents; Barton, Duer & Koch Paper Company, 21.5 cents; Stanford Paper Company, 19.25 cents; Mathers-Lamm Paper Company, 21.78 cents; Walker-Goulard-Plehn Company, 21.52 cents; and Mudge Paper Company, 19.37 cents.

For 25,200 pounds (200,000 sheets) of 31 x 38, 50% rag, white bond paper; Paper Corporation of U. S., 12.6 cents; Old Dominion Paper Company, 13.479 cents; Cauthorne Paper Company, 10.87 cents; Aetna Paper Company 10.63 cents; R. P. Andrews Paper Company, 10.85 cents; Stanford Paper Company, 11.34 cents; Mathers-Lamm Paper Company, 11.03 cents; Walker-Goulard-Plehn Company, 13.7 cents; and Mudge Paper Company, 10.84 cents.

For 10,000 pounds (104,000 sheets) of 20 x 25 terra cotta antique machine finish cover paper; R. P. Andrews Paper Company, 7.24 cents; Barton, Duer & Koch Paper Company, 7.65 cents; and Stanford Paper Company, 7.71 cents.

For 8,000 sheets of 15 x 21 Crane's artificial parchment paper; Z & M. W. Crane Inc., $48.31 per M. sheets; Barton, Duer & Koch Paper Company, $48.50; R. P. Andrews Paper Company, $48.31; and Mathers-Lamm Paper Company, $18.50.

For 37,500 pounds (1,500,000 sheets) of 50% rag, 21 x 32 white manifold paper; Marquette Paper Company, 16.72 cents; R. P. Andrews Paper Company, 20.23 cents; Barton, Duer & Koch Paper Company, 16.19 cents; and Mudge Paper Company, 16.3 cents.

For 39,000 pounds of 25% rag, 24 x 38 white bond paper; Aetna Paper Company, 10.38 cents; R. P. Andrews Paper Company, 10.17 cents; Mudge Paper Company, 9.73 cents; Paper Corp. of U. S., 10.47 cents; Butler Company, 9.76 cents; Baxter Paper Company, 10.57 cents; and Cauthorne Paper Company, 10.17 cents.

For 57,500 pounds of same 21 x 32; Aetna Paper Company, 10.38 cents; R. P. Andrews Paper Company, 10.31 cents; Mudge Paper Company, 9.73 cents; Paper Corp. of U. S., 10.47 cents; Butler Company, 9.76 cents; Baxter Paper Company, 10.57 cents; and Cauthorne Paper Company, 10.38 cents.

Gair Policy for Drafted Workers

The policy of the Robert Gair Company, Inc., 155 East 44th street, New York, applicable to employees who may be drafted for military service, or who are members of the National Guard and are called into active service, is stated in the attached notice to all employees in the United States.

The Company operates the following plants in this country: Bogota Paper and Board Corporation, Bogota, N. J.; Cleveland Cartons Division, Cleveland, Ohio; Connecticut Corrugated Box Division, Portland Conn.; Eastern States Cartons Division, Brooklyn, N. Y.; Gair Boston Containers Division, Newton, Upper Falls, Mass.; Gair Cartons Division, Piermont, N. Y.; Haverhill Boxboards Division, Haverhill, Mass.; Holyoke Fibre Box Division, Holyoke, Mass.; Ohio Containers Division, Cleveland, Ohio; Pa Pro Containers Division, Utica, N. Y.; Pennsylvania Corrugated Box Division, Philadelphia, Penna.; Syracuse Containers Division, Syracuse, N. Y.; Tonawanda Boxboards Division, Tonawanda, N. Y.

The following policy has been adopted applicable to employees of the Company who may be drafted for military service, according to the provisions of The Selective Service and Training Act of 1940, or who are members of the National Guard and are called for active training.

(1). One month's pay will be given to each employee who has been in the employ of the Company for two years or more, on leaving the Company for military service. In the case of hourly rate employees, 175 hours times the rate per hour will represent one month's pay. Such payments are subject to payroll deductions required by law, such as Federal and State Unemployment deductions and Federal Old Age Insurance deductions. The provisions of this paragraph are subject to cancellation by the Company at any time that circumstances indicate such action is necessary.

(2). The employees Group Life Insurance will be maintained at the expense of the Company, subject, however, to discontinuance at any time at the discretion of the Company. The maximum period to be one year plus forty days.

(3). The employees will be given a leave of absence without pay (except as provided above). Such absence will not affect his seniority and will count as continuous service with the Company when he is re-employed as provided below.

(4). If the employee applies for re-employment within forty days after conclusion of his training period, he will be entitled to be restored to his former position or to one of like seniority, status and pay; provided he is still physically qualified to perform the duties of his former position.

(5). Present employees who may be promoted to or given positions previously occupied by others called for military service will hold such positions temporarily, subject to the return of the employees on leave of absence.

(6). New employees hired to replace other employees on military leave of absence will have the status of *temporary* employees, and, to such, the above statements of policy will not apply.

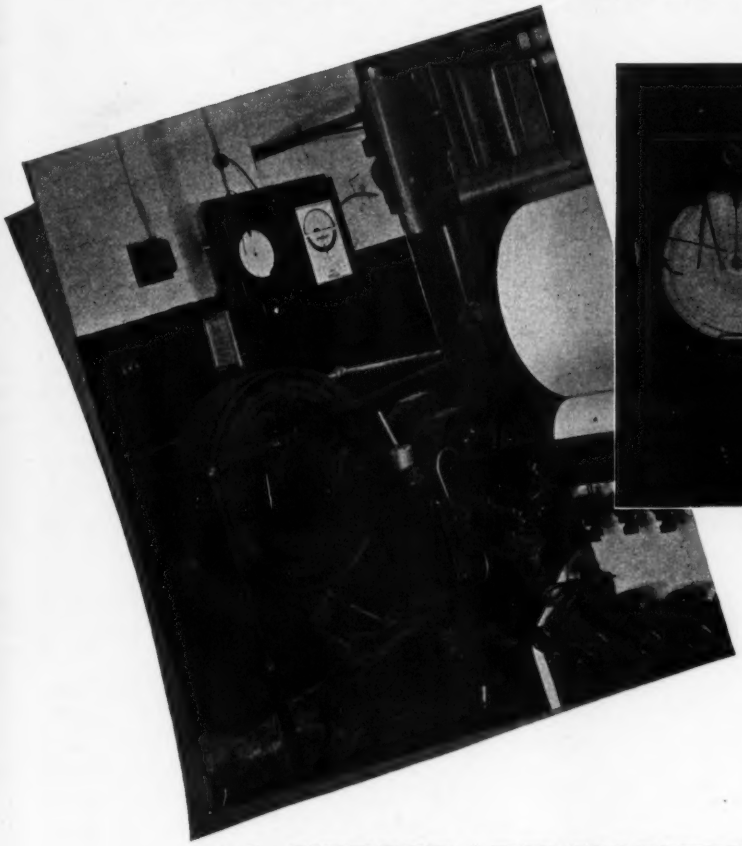
To Reclaim Waste Paper

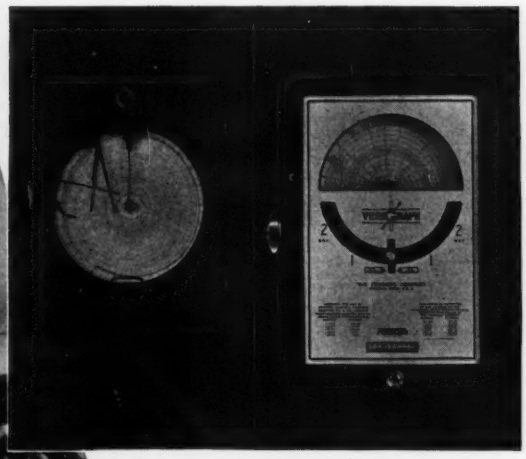
A report in the Pittsburgh, Pa., *Press* of November 5 states that T. H. Enterprises. Inc., headed by Joe C. Trees, Pittsburgh oil man, has leased an abandoned tire plant, at East Palestine, O., for the reclamation of used paper for the production of newsprint.

Using the reclamation method developed by Dr. F. W. Hochstetter, Pittsburgh scientist, who is a vice president of the company, the firm already is installing the machinery.

"Pin Down" Moisture Content

to New Close Limits . . . . .





(*above*) Verigraph Moisture Control instruments.

(*left*) Typical installation in New England fine-grade mill.

. . . with VERIGRAPH MOISTURE CONTROL

Now you can hold the moisture content of paper closer to the ideal Equilibrium Point than you would have believed possible with your present drying equipment . . . by installing Verigraph Moisture Control.

These precision Foxboro Systems measure the moisture content of the moving sheet with a degree of accuracy previously unknown. Variations as small as 1/10 of 1% bring instant control action . . . readjust temperatures with exactness subject only to the efficiency of the dryer itself. Any moisture-deviation from the control point is also accurately recorded.

Benefits that never could be consistently attained before, are now available to paper manufacturers. Full fiber strength is always maintained because overdrying is eliminated. Finish, caliper and weight are vastly improved by the greater moisture-uniformity. Sheet dimensional changes are practically ended.

Get the full story of this original Foxboro development that is producing remarkable results in more than 200 installations. Write for Bulletin 212-1. **The Foxboro Company, 114 Neponset Ave., Foxboro, Mass., U. S. A. Branches in 25 principal cities.**

FOXBORO
REG. U. S. PAT. OFF.
Instrumentation

Association Announces Meetings

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., November 11, 1940—Over the signature of Nathaniel Saxe, president of the Paper Trade Association of Philadelphia the following letter was sent out during the week to the members of the Association: "Your Board of Governors has decided to establish regular monthly meetings of the fine and wrapping paper divisions, to be held jointly on the second Monday of each month. In the event that the scheduled time falls on a holiday, the meeting will be held the following day. The next meeting will be on Tuesday, November 12. This was done with a very definite purpose. Our problems today are those that particularly belong to either wrapping, fine or bag groups, but must be solved with the brains and intelligence of the entire association. We must band together for common defense, be patient, and talk over one another's troubles at these meetings. They will be held at the Down Town Club, Ledger Building, 6th and Chestnut sts., Phila. The meeting will start with a luncheon, which is free to all our members. In this connection we might state that we have a balanced budget and, therefore, can afford the outlay.

"Bearing in mind that this association represents all the fine paper houses and a great majority of the wrapping and bag and in volume about 85 per cent of the business, the hour or two spent regularly once a month, to meet with a group of this character, should certainly result in giving us enough ideas and thoughts to run our business in a fair, decent and profitable manner. Don't ask: 'What is the Association doing for me?'—But come and see and help do something for the Association."

Newsprint Production Expands

Production of newsprint in Canada during October 1940 amounted to 309,957 tons and shipments to 287,943 tons, according to the News Print Service Bureau. Production in the United States was 88,192 tons and shipments 88,774 tons, making a total United States and Canadian newsprint production of 398,149 tons and shipments of 376,717 tons. During October, 31,573 tons of newsprint were made in Newfoundland, so that the total North American production for the month amounted to 429,722 tons. Total production in October 1939 was 389,026 tons.

The Canadian mills produced 543,678 tons more in the first ten months of 1940 than in the first ten months of 1939, which was an increase of twenty-three and two tenths per cent. The output in the United States was 64,542 tons or eight and two tenths per cent more than in the first ten months of 1939, in Newfoundland production was 41,971 tons or sixteen and seven tenths per cent more, making a total increase of 650,191 tons, or nineteen and three tenths per cent more than in the first ten months of 1939.

Stocks of newsprint paper at the end of October were 180,326 tons at Canadian mills and 18,648 tons at United States mills, making a combined total of 198,974 tons compared with 177,542 tons on September 30, 1940, and 208,532 tons at the end of October 1939.

N. P. T. A. Announces Winners

The National Paper Trade Association announces the following list of the award winners submitting the best answers to question No. 4, "Your paper is O. K. but I have to have it on these terms:—"

1ST PRIZE—A. H. Whitley, Jr., Parker Paper Company, High Point, N. C.

2ND PRIZE—J. W. Murphy, Carter, Rice & Co., Corporation, Portland, Oregon.

3RD PRIZE—J. T. Constantine, Andrews Paper House of York, York, Pa.

4TH TO 8TH PRIZE WINNERS

S. R. Spencer, Spokane Paper & Stationery Company, Spokane, Wash.; L. W. Knoblach, Lehigh Valley Paper House, Allentown, Pa.; R. R. Murphy, Peterson Paper Company, Davenport, Iowa; P. D. Hughes, Stone & Forsyth Company, Boston, Mass.; Raymond Sellon, American Paper Company, Milwaukee, Wis.

HONORABLE MENTION

Robert N. Benham, Wilcox-Mosher-Leffholm Company, Minneapolis, Minn.; R. L. Clark, A. E. MacAdam & Co., Inc., Brooklyn, N. Y.; G. H. Crawford, Stone & Forsyth Company, Boston, Mass.; R. G. Gaines, Crescent Paper Company, Indianapolis, Ind.; C. H. Gravett, Scioto Paper Company, Columbus, Ohio; W. G. Harbers, John C. Streibich Company, Peoria, Ill.; A. C. Iobst, Lehigh Valley Paper House, Allentown, Pa.; D. L. Jones, Roach Paper Company, Little Rock, Arkansas; H. J. Noth, Peterson Paper Company, Davenport, Iowa; H. Ralph Schaffer, Beecher, Peck & Lewis, Detroit, Mich.; Don Van Ostenberg, Beecher, Peck & Lewis, Detroit, Mich.

Mutual Box Co. Gets Desist Order

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., November 13, 1940—The Federal Trade Commission has accepted from Mutual Fibre Box Company, New York City, a stipulation in which they agree to cease and desist from certain representations in the sale of fiber board packing boxes.

Under their stipulation, the respondents agree to desist from marking or stamping such boxes with the purported certification of a box maker or manufacturer together with such use of their trade name "Mutual Fibre Box Company" as may tend to create the impression that they make or manufacture such boxes.

The respondent co-partners also agree to cease using on their stationery or printed matter, or in marking or stamping the boxes, or otherwise, in connection with the sale of such products, the word "manufacturers" or "makers," or other words of similar meaning, so as to imply that they actually own and operate or control a factory in which the boxes are made.

Paper Man Presents Trophy

Robert Olmstead of the Olmstead-Kirk Company, 1033 Young street, Dallas, Texas, general paper merchants, has presented the company's trophy for the outstanding example of house organs to the Dallas Power and Light Company.

- An ideal pigment color for paper.
- Suitable for envelope, bag, tire-wrap and similar types of stock.
- Yields bright, greenish shades of yellow.
- Shows very good fastness to light.
- Will not darken or turn black on exposure.
- Possesses generally satisfactory dyeing properties.
- Wets out and disperses readily.
- May be used in the beater and for coating.
- Combined with Du Pont Paper Blue S or LITHOSOL Fast Green Powder (P. A. F.) a wide variety of very fast-to-light greens are obtainable.
- Manufactured in accordance with high Du Pont standards of quality, a consistently uniform product is assured.

Reg. U. S. Pat. Off.

E. I. DU PONT DE NEMOURS & CO. (INC.)

Organic Chemicals Dept., Dyestuffs Division

WILMINGTON, DELAWARE

CONSTRUCTION NEWS

Pittsburgh, Pa.—The Standard Box Company, 27th street and Allegheny Valley Railroad, manufacturer of corrugated boxes and containers, has completed plans for new addition to plant, to be one-story, 90 x 120 feet, reported to cost over $50,000, with equipment. Bids are being asked on general erection contract. James J. Cravotta and Oscar Liff, 250 Atwood street, are architects.

Rhinelander, Wis. — The Rhinelander Paper Company, manufacturer of glassine, greaseproof and other processed paper stocks, has awarded general contract to C. R. Meyer & Sons Company, 50 State street, Oshkosh, Wis., for new additions to mill, consisting of a main one-story unit, 102 x 450 feet, to be used for expansion in beater department, machine room and finishing division, and a one-story smaller structure adjoining to be equipped as a digester building. Excavations have been placed under way and work on superstructure will begin soon. An award for structural steel framing has been made to the Wisconsin Bridge & Iron Company, Milwaukee, Wis. Company also will expand steam power house at mill, erecting a one-story structure, 27 x 64 feet. Construction award has been made to the same company and similarly, excavations are in progress. Installation will include new boiler units, pumps and auxiliary equipment. Entire project is reported to cost over $250,000, with equipment, and is scheduled for completion early in 1941.

Bellingham, Wash. — The Puget Sound Pulp and Timber Company, manufacturer of unbleached sulphite pulp, has completed pile-driving and excavations for new additions to mill, recently referred to in these columns, and will proceed with erection of superstructures as soon as foundations are ready. Work will include an addition, 80 x 340 feet, for expansion in machine department; new digester building, 42 x 72 feet; extension in power house, 28 x 40 feet, and auxiliary structures. Two new acid towers will be built, as well as two silos for sulphur storage. Orders are being placed for machinery and equipment, with delivery of primary equipment scheduled in 1941. Plant capacity will be increased about one-third, making a total rating of 150,000 tons per annum for the mill. General erection contract is being carried out by the Howard S. Wright Company, 407 Yale street, North, Seattle, Wash. Entire project will represent an investment of about $1,500,000.

St. Louis, Mo. — Drug Package, Inc., 2419 Glasgow avenue, manufacturer of paper boxes and containers for the drug trade, has approved plans for new addition to plant, on site on North Market street, near Glasgow avenue, consisting of a one-story structure, 20 x 180 feet, reported to cost over $50,000, including equipment. It will be equipped for increased capacity. General erection contract has been awarded to the George Moeller Construction Company, 3007 Wyoming street, St. Louis, and work will be placed under way at once. Leonhard Haeger, 3844 Utah place, St. Louis, is architect.

New Companies

New York, N. Y.—The Bagnasco Label Corporation has been incorporated with capital of 200 shares of stock, no par value, to operate a paper-converting plant for the production of paper labels, stickers, tags, etc. New company is represented by Henry Uttal, 521 Fifth avenue, New York, attorney.

Chicago, Ill.—The Midwest Waste Paper Service, Inc., 1635 West Fulton street, has been incorporated to deal in waste paper products. New company will take over and succeed to organization of same name, with headquarters at location noted. The incorporators are R. Belkin and D. Allen.

Boston, Mass. — The Enterprise Wall Paper Company, Inc., has been chartered with capital of $25,000, to deal in wall paper stocks, etc. H. V. O'Brien is president; and M. C. Sullivan, 50 Bennett street, Brighton, Mass., treasurer and representative.

COMMISSION HOLDS FIRST HEARING

(Continued from page 13)

The company went into liquidation, Mr. Macpherson said, because of capital committments rather than those of earnings. Earnings were $69,000 000 over a 15 year period. Working capital had changed tremendously during the last seven years, he said. In 1933 there had been a deficit of $379,098; another of $243,930 the following year. In 1934, working capital was $1,762,850, he showed, and, giving the figures for each succeeding year, wound up with $16,425,983 as of September 30 this year.

Mr. Macpherson said he would be glad to submit his ideas for re-organization to the commission, but first wanted to give further study to possible taxes.

Average Earnings of Abitibi $5,109,000

A "sustained or average" annual earning power for Abitibi of $5,109,000 was estimated in a report submitted by a New York firm of consulting engineers, read by R. M. Fowler, assistant counsel to the commission. The estimate was arrived at after annual depreciation totaling $1,600,000 was charged off, but includes allowance for interest and income tax payments. The report placed the commercial value of the properties at $73,762,500, exclusive of the Thunder Bay and Espenola mills which Mr. Clarkson had suggested should not be rehabilitated.

Summarizing the various plans for re-organization offered the commission to date, it may be said that the plan of A. E. Osler & Company seemed to meet all contingencies; the E. B. Kernaghan plan placed emphasis on segregation of power from industrial assets; the William D. Ross plan stressed ways and means of repaying obligations to hondholders, in whole or in part, over a period, out of surplus earnings. The W. C. Lamont plan was quite similar to the Ross plan. Details of most of these plans have been published on this page from time to time.

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PAPER TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Vol. 111 November 14, 1940 No. 20

COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

BUSINESS OUTLOOK BRIGHT

The outlook for general business continues bright, with the prospect that a high record of industrial production will be attained in 1941. The concern expressed by some economists and business commentators that the trend of inflation may prove a deterring factor, is apparently without factual foundation. It may be said that inflation is essential for prosperity, and that a moderate degree of inflation is exactly what is required to stimulate general business. Prices are now relatively low and the fear that they may rise too rapidly or too high in relation to wages or purchasing power, is viewed as unlikely because of government controls. It is well known that the Government is concerned with keeping prices and wages in balance. The prospect, therefore, appears bright for a controlled inflation in the forthcoming business boom which many business economists have been forecasting for some months.

The increase in the statutory debt limit is not viewed as likely to have adverse effects upon business. The increase from the present $49,000,000,000 to $60,000,000,000 or possibly to $65,000,000,000, is viewed by some business men as essential to insure the success of the national defense program. In connection with an offering of defense bills by the government, Secretary Morgenthau said on November 7 that "One reason we are issuing them is that we have practically reached the debt limit. Until Congress increases it we find ourselves in a rather difficult position. When we get the increase we shall probably sell notes instead of bills." But regardless of the form of future Government issues, the Secretary said he hoped Congress would make all taxable. "The time has come," Mr. Morgenthau said, "when we need money for national defense. People who invest in that type of security should pay taxes like every one else. I don't think it is possible to pay entirely as you go. But as the tremendous volume of production for defense get under way revenues are bound to increase. Meanwhile, we are keeping a close eye on the cost of living and any indications of inflation. If any commodity gets out of line we will be given the means to stop it. If the cost of living went up as employment increased workers would get no advantage."

Senator Byrd of Virginia declared that he would vote for any increase in the debt limit necessary to finance national defense. "In the face of gigantic expenditures for national defense, the Senator said, "the Federal Government is still spending approximately the same huge amounts for strictly non-defense and non-essential peacetime activities of the government. Unless the country is to incur a debt of such magnitude as to menace seriously our financial security, the time has come to reduce non-essential, non-defense spending to the absolute minimum and devote consequent savings to financing the defense program, and no effort has been made yet for such reductions. Notwithstanding the terrific taxation now being paid by the American people, our Federal Government is not collecting enough to pay our strictly peacetime expenditures, after eliminating every dollar disbursements for national defense. We should at once economize on non-essential peacetime spending."

In commenting on the business prospect the last issue of the *Survey* issued by the Guaranty Trust Company of New York said in part: "Almost all the leading indicators of domestic business point to a sustained high level of activity, although some signs of a tapering off of the upward movement have appeared in the last few weeks. Railway freight loadings, for example, rose almost uninterruptedly from the beginning of August to the end of September; but the trend has turned irregular since the beginning of October, and for the first time this year the current figures are somewhat below those for 1939. . . Such interruptions as have occurred in the upward trend of business, however, have apparently not greatly altered general expectations for coming months. The Department of Commerce forecasts a further rise in activity to record levels during the last quarter of the year, declaring that further expansion in manufacturing industries during the winter months is assured by the flow of new business, stimulated by the defense program and heavy demand for war materials from abroad, which has raised backlogs of unfilled orders to a high level."

Sounding a note of caution with respect to the inventory situation, the *Survey* points out that "The rise in prices last month is not regarded as significant, apart from a few commodities; but it is believed to indicate that a vulnerable spot in the present business situation is the possibility of a resumption of inventory accumulation. Inventories are considered already high enough to support a much larger volume of pro-

duction than has been attained in recent months. The trend of commercial and industrial failures is rather indeterminate. Insolvencies, as reported by Dun & Bradstreet, declined from August to September by slightly more than the usual seasonal amount and, for the first time since June, were fewer than a year ago. The total for the two weeks ended October 17, however, was 3.5 per cent above that for the corresponding period last year.

In discussing the rising tide of employment throughout the country, the *Survey* states that "Business expansion resulted in a further decline in unemployment during August, according to the estimate of the National Industrial Conference Board. The number of unemployed in that month is placed at 7,657,000, the lowest since November, 1937, marking a decrease of 7.5 per cent from the July figure. The total is 1,181,000 below that of a year ago but is more than 2,500,000 above the low point for 1937. The Bureau of Labor Statistics reports a further rise in factory employment last month."

The Federal Reserve Board index of industrial production rose to 127 for October, from 125 in September, compared with 126 for October, 1939, and 117 for the high point in 1929. A list of 350 companies, according to the National City Bank of New York, showed an increase in earnings of 42.3 per cent for nine months of 1940 over 1939, with the yearly rate of earnings on net worth up 10.4 per cent in 1940, from 7.4 per cent for 1939.

Bogus Club Dinner Postponed

In view of the general disturbed conditions and the large number of men, either called to active duty with the Army or engaged in war work of some kind, it has been decided that the Annual Dinner of the Bogus Club would not be held.

Among those called to active duty was Captain Leslie B. Carpenter of the U. S. Army Reserve Corps. Captain Carpenter was President of the Bogus Club during 1939. He received a telegram from the Commanding Officer of his Corps Area ordering him to report at Fort Totten, N. Y. This twenty-four hour notice was a short notice in which to arrange for his many customers to be taken care of by other salesmen of Charles F. Hubbs & Company.

A farewell luncheon with his fellow members of the Bogus Club and the executives of Charles F. Hubbs & Company was hastily arranged and like many impromptu gatherings was a great success as well as a surprise to Captain Carpenter. After the luncheon a meeting of the Bogus Club was held at which the decision to omit the Annual Dinner during this National emergency and until it was possible to welcome back to civil life the many members who will have served their period of training in the National Defense service.

The present officers of the Bogus Club who were elected for one year will continue until it is thought best by the Executive Committee to hold the dinner again. In the meantime, the monthly luncheons and other activities of the Club will be continued as usual.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1940	1939	1938	1937	1936	1935	1934
January	90.2%	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	86.2%	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	83.9%	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	86.3%	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	91.8%	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	93.8%	79.7%	66.0%	87.3%	80.7%	72.3%	.....
July	87.1%	75.2%	72.0%	81.8%	77.3%	64.9%	.....
August	87.2%	82.9%	77.2%	82.9%	81.5%	70.9%	.....
September	83.3%	88.7%	76.3%	78.6%	80.5%	71.9%	58.2%
October	88.4%	96.6%	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	97.2%	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	91.1%	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	.....	84.9%	72.3%	80.6%	81.3%	70.5%	.....
First 44 weeks	87.9%	83.3%	71.5%	85.1%	80.4%	70.1%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS, 1940		CORRESPONDING WEEKS, 1939	
September 28	89.3%	September 30	95.7%
October 5	87.9%	October 7	93.0%
October 12	88.9%	October 14	96.9%
October 19	87.5%	October 21	98.6%
October 26	88.5%	October 28	97.9%
*November 2	89.3%	November 4	98.0%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Sept. 28, 1940	Oct. 5, 1940	Oct. 12, 1940	Oct. 19, 1940	Oct. 26, 1940	Nov. 2, 1940
0% to 50%	44	50	50	53	43	37
51% to 100%	251	244	238	233	239	199
Total Mills Reporting	295	294	288	286	282	236

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%
1940	71%	70%	69%	70%	76%	79%	72%

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	72%	74%	84%	81%	71%	70%
1940	74%	72%	79%	....	....	....

Week end. Sept. 28, 1940—78%
Week end. Oct. 5, 1940—78%
Week end. Oct. 12, 1940—79%
Week end. Oct. 19, 1940—78%
Week end. Oct. 26, 1940—80%
Week end. Nov. 2, 1940—80%

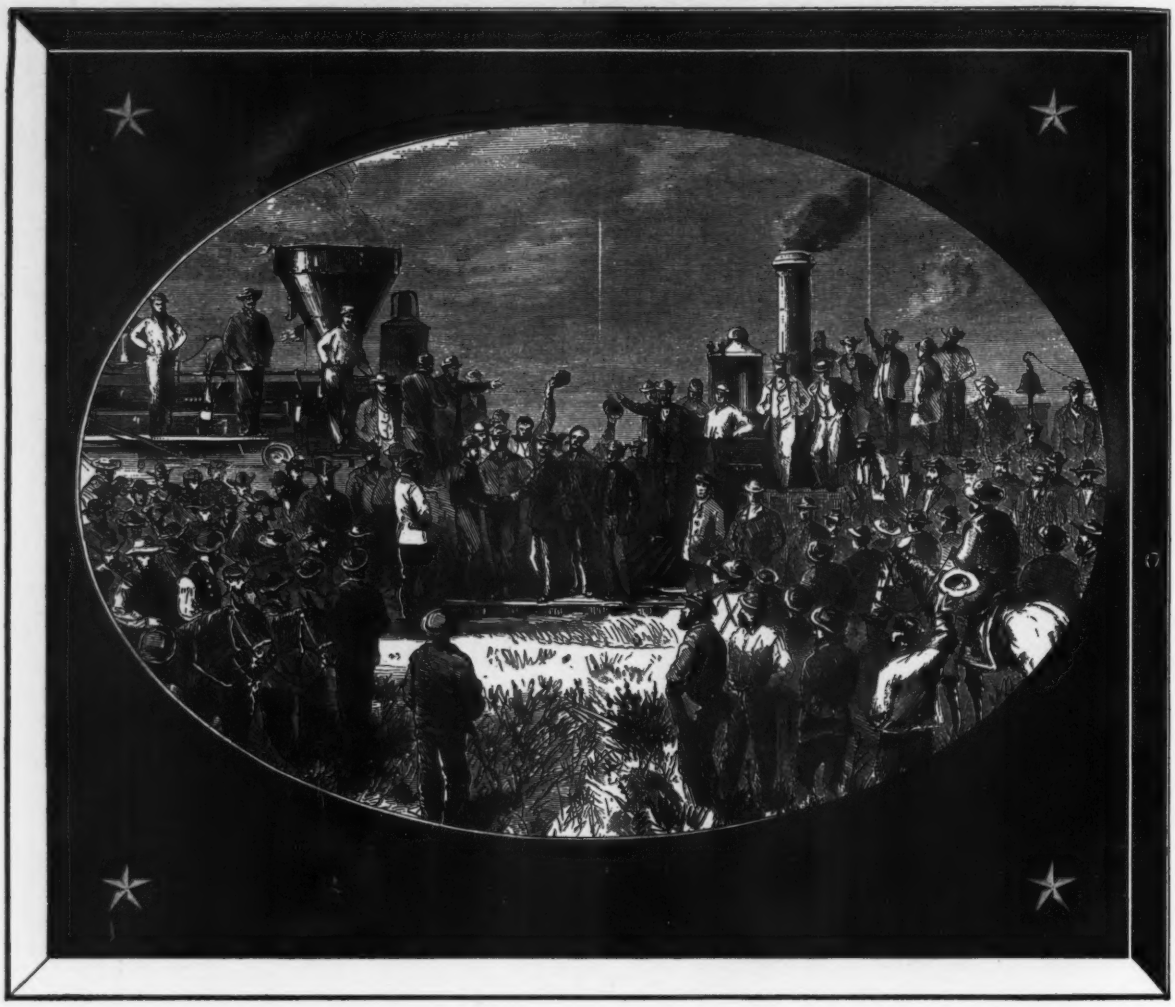
[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.
* Preliminary figure.

Dexter Sulphite Co. Busy

WATERTOWN, N. Y., November 12, 1940—The Dexter Sulphite, Pulp and Paper Company is running at full capacity with a good sheaf of orders on the spindle, it was said at the office of W. E. McIntyre and B. C. Foster, equity receivers of the concern.

Waxed, greaseproof and other wrapping papers are being produced by the company's paper mill and the sulphite plant is turning out approximately 2,200 tons of high-grade sulphite every four weeks.

During the summer months a wood pile has been accumulated for the coming winter, the wood purchased from Canada, having been brought up the St. Lawrence river in freighters to Cape Vincent, whence it was transshipped by rail to Dexter. Two more cargoes are expected during November, which will make the wood pile sufficient to supply the needs of the plant through the winter and well past the opening of the next navigation season in April.



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Determination of Wax in Sizing Products*

By W. E. Shaefer[1] and A. C. Dreshfield[2]

Abstract

A direct method for the determination of wax in dry size, paste size, or wax emulsions is described. It depends on the high solubility of wax in hot acetic anhydride and its low solubility in cold acetic anhydride. The method requires little time, is adapted to routine use, and yields accurate results.

In the past, methods for determining the wax content of rosin-wax sizes or of papers sized with these materials have been somewhat inadequate. The need for an improved procedure has become more urgent because of the recent interest in rosin-wax sizes in the production of specialty papers and boards.

For example, if the present standard method for determining wax in paper *(1)* is applied to the determination of wax in rosin-wax size, the results are in error by the amount of unsaponifiable resinous matter which is extracted along with the wax from the aqueous alkaline suspension of saponified products. This error is large if the wax content of the size is low. By the method of Porter and Thomas *(2)* the wax content is determined indirectly. The method requires a knowledge of the acid number and unsaponifiable content of the rosin used in manufacturing the product. The wax content of the original rosin-wax mixture is found by difference between 100 and the per cent of rosin in this original mixture. The rosin content is calculated from a titration of the acid-precipitated materials (total free and combined rosin) in the product. It would have been desirable for them to have included a method for calculating the wax content of the finished size.

Selective solvents that might be used for the analytical separation of wax from petroleum have been discussed comprehensively *(3)*, and a method for the determination of waxes in petroleum and its lubricating fractions has been published *(4)*. Additional data on the solubilities of waxes in various solvents are available *(5)*. For some time our laboratories have been using several variations of a method for the determination of wax in the solvent extracts of papers and in rosin size-wax mixtures. These methods depend essentially on the high solubility of the extracted wax in hot acetic anhydride and its low solubility in cold acetic anhydride. The authors have improved the technique so as to be able to determine the wax content of paste rosin sizes, dry sizes, and wax emulsions.

The basic method herein described was designed for the determination of wax in dry size, but subsequently was applied to the determination of wax in paste rosin-wax size and wax emulsions. Throughout most of the experimental work, it was assumed that the waxes encountered would be essentially amorphous or crystalline paraffin waxes of various melting points. As applied to dry size, the method consists essentially of dissolving the dry size sample in a hot acetic anhydride-acetic acid mixture, which previously has been saturated with wax, and then cooling and filtering this solution. The precipitated wax retained on the filter is dissolved in benzene; the benzene solution is evaporated; and the residue of wax is weighed.

Wax Mixtures

Synthetic mixtures of *(a)* a high-melting amorphous wax with a nonwax-containing dry rosin size (hereinafter referred to as Type C Dry Size) and of *(b)* a low-melting crystalline paraffin wax with Type C Dry Size were prepared and analyzed by the foregoing method. In each of these experiments, one-gram mixtures of wax and Type C Dry Size were treated with 30 cc. of 90% acetic anhydride-10% acetic acid solution, which had previously been saturated with high-melting amorphous wax, and heated until solution was complete. Acetic acid was added to the acetic anhydride to decompose the rosin soaps. The solution was saturated with wax in advance in order to avoid making a correction for the slight solubility of the wax in the cold solution. The solutions were cooled and filtered. The flasks and filter papers were washed with a 90% acetic anhydride-10% acetic acid solution which had also been saturated with high-melting amorphous wax. The precipitated wax was dissolved in benzene; the solution was evaporated; and the residue was weighed. The temperatures at which the solvent and wash solutions were saturated with wax, and the temperatures to which the solutions containing precipitated wax were cooled, were varied as indicated in Table I.

The procedure followed in Experiments 5 to 8 is preferable to that in Experiments 1 to 4 because the filter papers, while being washed, are nearer to room temperature than to 0 deg. C. The low results of Experiments 11 and 12 were probably caused by the

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Olympic Hotel, Seattle, Wash., Aug. 20-23, 1940.

[1] Hercules Powder Company, Wilmington, Del.
[2] Member TAPPI; Director of Operations, Paper Makers Chemical Department, Hercules Powder Company, Wilmington, Del.

TABLE I.—ANALYSES OF KNOWN MIXTURES

Expt.	Kind of Wax Used	Saturated [1] deg. C.	Wax Cooled [2] deg. C.	Saturated [3] deg. C.	Wax in Mixture: Present %	Wax in Mixture: Found %	Difference [4] %
1	Amorphous	0	0-2	0	19.9	19.8	—0.1
2	Amorphous	0	0-2	0	19.9	19.6	—0.3
3	Crystalline paraffin	0	0-2	0	20.0	19.8	—0.2
4	Crystalline paraffin	0	0-2	0	20.3	20.2	—0.1
5	Amorphous	0	0-2	25	19.9	19.6	—0.3
6	Amorphous	0	0-2	25	20.2	20.0	—0.2
7	Crystalline paraffin	0	0-2	25	20.6	20.5	—0.1
8	Crystalline paraffin	0	0-2	25	20.3	20.0	—0.3
9	Amorphous	25	20-25	25	19.9	19.6	—0.3
10	Amorphous	25	20-25	25	19.9	19.7	—0.2
11	Crystalline paraffin	25	20-25	25	20.0	18.9	—1.1
12	Crystalline paraffin	25	20-25	25	19.9	18.7	—1.2

[1] Temperature at which solvent solution was saturated.
[2] Temperature to which solution containing precipitated wax was cooled.
[3] Temperature at which wash solution was saturated.
[4] Difference between amounts present and found.

fact that srystalline paraffin wax is more soluble in acetic anhydride than is the amorphous wax. On the basis of other results not included in Table I is appeared to be an excellent plan to saturate the solvent solution with *both types* of waxes at the temperature at which the solution is to be used. This procedure was adopted in subsequent experiments.

Information regarding loss in weight of wax on being heated at 100 deg. C. and its solubility in the solvent and wash solutions were obtained in order that a detailed procedure might be written more intelligently. The results are shown in Tables II and III. They indicate that a heating period of 15 to 30 minutes for drying the wax is satisfactory and that the solubility of the waxes in a solvent solution consisting of 90% acetic anhydride and 10% acetic acid is very low.

TABLE II.—WAX RESIDUES FROM BENZENE SOLUTIONS

On continued heating at 100 deg. C.	Expt. 1 gram	Expt. 2 gram	Expt. 3 gram	Expt. 4 gram
After heating 15 min.....	0.1982	0.1962	0.1983	0.2015
After heating 30 min.....	0.1985	0.1962	0.1980	0.2013
After heating 90 min.....	0.1987	0.1962	0.1978	0.2011

Note: Experiments 1 and 2 were made with amorphous wax. Experiments 3 and 4 were made with low-melting crystalline paraffin wax.

TABLE III.—SOLUBILITY DATA

Solvent	Amorphous and Crystalline Paraffin Wax Dissolved at the Same Time in 50 cc. of Solvent gram
Ac_2O at 25 deg. C.....	0.0055
Ac_2O at 20 deg. C.....	0.0033
90% Ac_2O—10% AcOH at 0 deg. C.	0.0020

Reagents

1. The solvent solution consists of 90% acetic anhydride and 10 per cent acetic acid which has been saturated with both amorphous and crystalline wax at 0 to 2 deg. C. To 450 cc. of acetic anhydride add 50 cc. of acetic acid. To about 50 cc. of this solution add about 30 mg. each of crystalline and amorphous wax and heat the mixture until the waxes have dissolved. Pour this solution into the acetic anhydride-acetic acid solution, shake the mixture vigorously, and cool just to 0 to 2 deg. C. Filter rapidly to remove the precipitated wax.

2. The wash solution consists of 90% acetic anhydride and 10% acetic acid which has been saturated with both amorphous and crystalline wax at 20 deg. C. To about 50 cc. of acetic anhydride add about 100 mg. of crystalline wax and about 30 mg. of amorphous wax. Heat the mixture until the waxes have dissolved. Pour this solution into about 450 cc. of acetic anhydride, shake the mixture vigorously and cool it just to 20 deg. C. Filter rapidly to remove the precipitated wax.

3. Carborundum[3] (10 mesh) is used to prevent bumping.

Procedure

Place one-gram samples of dry size, weighed to the nearest 0.001 gram, in 125-cc. Erlenmeyer flasks. To each flask add a few particles of 10-mesh carborundum and 30 cc. of reagent 1. Heat to boiling on a hot plate and continue the boiling for a moment until the solvent vapor can be seen issuing from the mouths of the flasks. This treatment decomposes the sodium salts of the resin acids and brings the samples completely in solution.

Cool the flasks in ice water until they reach a temperature of 0 to 2 deg. C. This may be accomplished by cooling them in 400-cc. beakers of tap water at 20 deg. C. or lower for three minutes or longer and then in 400-cc. beakers of ice water for five minutes or longer, without using a thermometer.

Filter the solutions through 7-cm. no. 41 Whatman filter papers, collecting most of the precipitated wax on the filters. Wash each flask twice with 5 to 10 cc. of reagent 2, pouring the wash solution through the filter paper, and then wash each filter paper two or three times with reagent 2. Discard the filtrates.

Place weighed 100-cc. beakers under the funnels. Pour small portions of benzene into each of the flasks, heat the benzene to boiling, and decant it into the corresponding filter papers. Repeat this operation in order to remove quantitatively the last traces of wax from the flasks. Wash the filter papers two or three times more with small portions of hot benzene in order to free them of wax.

Evaporate the benzene solutions to dryness on a steam bath in a hood, using an air stream if rapid evaporation is desired, and heat the wax residues in an oven at 100 deg. C. for 15 to 30 minutes. Weigh the beakers containing the wax residues after they have cooled. *Calculation:*

$$\frac{\text{weight wax} \times 100}{\text{weight sample}} = \%\ \text{wax on "as received" basis}$$

$$\frac{\%\ \text{wax on "as received" basis} \times 100}{\%\ \text{total solids in orig. sample}} = \%\ \text{wax on dry basis.}$$

The foregoing method was applied to several known mixtures of dry size and wax with excellent recovery of the latter as shown in Table IV. In addition, the wax content of several samples of dry rosin-wax size was determined by three analysts, to ascertain the reproducibility of the method. The results obtained by the three analysts agreed closely, as shown in Table V.

TABLE IV.—ANALYSIS OF DRY ROSIN SIZE—WAX MIXTURE

(Of known composition by recommended procedure; Type C Size)

Kind of Wax Used	Present %	Found %	Difference %
Amorphous	5.0	5.1	+0.1
Amorphous	5.0	5.2	+0.2
Crystalline	10.0	10.0	±0.0
Crystalline	9.9	9.7	—0.2
Crystalline	19.7	19.6	—0.1
Crystalline	20.0	19.8	—0.2
None	0.0	0.1	+0.1
None	0.0	0.1	+0.1

[3] This material can be obtained from the Carborundum Company, Niagara Falls, N. Y.

TABLE V.

Specimen	Number	Wax Found Analyst 1 %	Analyst 2 %	Analyst 3 %
Type CH	37,514	.....	.....	19.3, 19.3
Type AH	37,515	.....	.....	19.0, 19.0
Type AL	37,516	.....	.....	18.9, 18.9
Type AH	38,857	4.3, 4.2	4.2, 4.1	4.2, 4.2
Type AH	38,858	10.5, 10.5	10.5, 10.4	10.5, 10.6
Type AH	38,859	.....	.....	20.9, 20.9

Analysis of Wax Emulsions

Wax emulsions of known wax content which contained less than 50% water were analyzed by the foregoing procedure with two modifications:

(a) Reagents 1 and 2 were prepared by saturating a 95% acetic anhydride-5% acetic acid solution (instead of a 90% acetic anhydride-10% acetic acid solution, as was used before) with both amorphous and crystalline wax at 0 to 2 deg. C. and at 20 deg. C., respectively. The increased amount of acetic anhydride in reagent 1 reacts with the water present in an emulsion to form acetic acid.

(b) In case the mixture of the sample and reagent 1 did not form a clear solution on boiling, the boiling solution was rapidly filtered through a small no. 41 Whatman filter paper. Then the residue and filter paper were washed with hot reagent 1 in such a manner as to remove completely the wax from it and the filtrate was analyzed for wax in the usual way. The analysis of three emulsions of known wax content is given in Table VI.

TABLE VI.—ANALYSIS OF WAX EMULSIONS
(Wax content known)

Emulsifying Agent	Wax Present %	Wax Found %	Difference %
Protein-type	10.0	9.6, 9.5	—0.4
Soap-type	40.0	39.3, 39.5	—0.6
Hydrophilic	23.0	22.0, 21.9	—1.0

The lower accuracy of the results in Table VI is probably caused by the difficulty involved in dissolving the wax retained on the filter paper in hot reagent 1.

Need for Modification

In order to find if the procedure which has been described could be applied in the analysis of sizes containing unknown waxes, the solubility of several waxes in reagent 1 (90% acetic anhydride-10% acetic acid saturated with amorphous and crystalline waxes) was determined with the results shown in Table VII. The results are considerably higher than those for amorphous and crystalline low-melting paraffin waxes shown in Table III and indicate that the procedure to retain its precision must be modified before using it in the analysis of specimens containing unknown waxes.

TABLE VII.—SOLUBILITY OF WAXES IN REAGENT 1

Wax	Residue [1] gram
Blank on reagent 1 (Table III).....	0.0020
Carnauba wax	0.0033
Paraffin wax m.p. 154-160 deg. F.....	0.0055
Beeswax (dried)	0.0035
Petrolatum, m.p. 130-140 deg. F.....	0.0075
Montan wax (bleached).....	0.0078

[1] Found on evaporation of 50 cc. of reagent 1 which had been saturated with the wax stated at 0 to 2 deg. C.

Modification for Unknown Waxes

The foregoing method for the determination of wax in dry size can be made generally applicable to the determination of wax in any dry size, paste size, or wax emulsion containing less than 50% water, or to the solids left on the evaporation of any wax emulsion of higher water content, regardless of the type of wax that is present, by making the following modifications: (a) use 95% acetic anhydride-5% acetic solution, which takes care of any water content up to 50% of the sample, in preparing reagents 1 and 2; (b) filter the boiling mixture of the sample and reagent 1 if the solution is not clear and wash the filter paper adequately with hot reagent 1; and (c) use the specific wax, or mixture of waxes, isolated from another portion of the specimen being analyzed in preparing reagents 1 and 2. This wax can be isolated easily in 10 to 15 minutes, by treating a 1 to 2-gram sample of the specimen with water and with five cc. of dilute hydrochloric acid (1:3), (which precipitates most of the rosin acids and also serves to break a wax emulsion), cooling, filtering, boiling some of the collected residue for five minutes with 10 cc. of approximately normal sodium hydroxide solution (to remove all of the rosin except its unsaponifiable fraction), cooling, filtering out the mixture of precipitated wax and unsaponifiable resinous matter, washing the precipitate with water, and drying a portion of it rapidly in a small beaker on a hot plate. This material is used to saturate the acetic anhydride-acetic acid mixture when preparing reagents 1 and 2. The procedure just described was applied in the analysis of a specimen of dry size with the results shown in Table VIII.

TABLE VIII.—ANALYSIS OF TYPE AH DRY SIZE
(No. 38,859)

Reagents 1 and 2	Wax Found %
95% Ac_2O—5% AcOH solution saturated with isolated wax at 0—2 deg. C. and 20 deg. C. respectively	20.6, 20.7, 20.7
90% Ac_2O—10% AcOH solution saturated with amorphous and crystalline waxes at 0 to 2 deg. C. and 20 deg. C. respectively (Table V).....	20.9, 20.9

If this method is used extensively for routine determinations, a considerable amount of acetic anhydride will be required. The filtrates from the wax can be stored and the acetic anhydride recovered by distillation when the supply becomes large enough to make its recovery worth while. The method which has been described may be applied to the determination of waxes in paper by first isolating all ether- and alcohol-soluble materials by prolonged Soxhlet extraction. This was not done by the authors.

Duplicate determinations of wax in dry size, paste size, and wax emulsions should agree within 0.2 unit. If the wax content of a specimen of dry size or paste size is 20% or greater, the results should have an accuracy of 1% (0.2 unit when the result is expressed as per cent wax present). Analyses of wax emulsions are somewhat less accurate.

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(1) TAPPI Standard T 408 m-39, Resin in Paper, New York, Technical Association of the Pulp and Paper Industry, 1939.
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(3) Kalichevsky, Vladimar A., and Stagner, Bert Allen, "Chemical refining of petroleum", pp. 235-53, New York, Chemical Catalog Co., 1933.
(4) Horne, Joseph W. and Holliman, W. C., Bureau of Mines Technical Paper 583, 1938.
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H. H. Timken, Jr., Succeeds Father

CANTON, O.—Henry H. Timken, Jr., has been named Chairman of the Board of The Timken Roller Bearing Company, it was announced here this week. He will succeed his father, the late Henry H. Timken, Sr., in this capacity and will continue as Vice-president and general manager of the Steel and Tube Division of The Timken Roller Bearing Company.

Heat Transfer Characteristics of An Indirect-Heated Digester*

By J. G. L. Caulfield[1] and L. C. Jenness[2]

Abstract

The theory of the recirculating heat exchanger as applied to an indirectly heated digester is reviewed. Over-all coefficients of heat transfer obtained in an experimental digester are presented for a range of mass velocities from 29 to 130 pounds per square foot per second. Values of over-all coefficients based on output are found to vary from 204 to 412 B.t.u. per hour per square foot per deg. F., with water the fluid heated. These coefficients are compared with those calculated from theoretical film coefficients. Measured and theoretical coefficients are given for one alkaline pulp cook.

With rapidly increasing use of external circulating heaters in digester operation, the heat transfer characteristics of such apparatus are of interest. The principal feature which distinguishes such a heater from the usual heat exchanger is a continuously decreasing temperature difference between heating steam and liquid circulated as the digester comes up to temperature. Over that period of heating, before radiation becomes appreciable, the process may be considered the same as a batch operation, to which, given constancy of over-all coefficient and of specific heat, the logarithmic average temperature difference with respect to time is known to apply (*1*). The usual equation:

$$\frac{q}{\theta} = U A \Delta t_{ave} \qquad (1)$$

where

q = B.t.u. transferred
θ = time, hours
U = over-all coefficient of heat transfer, B.t.u./hr./sq. ft./deg. F.
A = area of heating surface, sq. ft.
Δt_{ave} = logarithmic average temperature difference at start and at end of θ hours.

may then be employed for necessary calculations.

Actually, constancy of coefficient and of specific heat cannot be expected if a fluid is passing through a wide temperature range, so that the use of the above equation will be an approximation, the accuracy of which will depend upon the variation in coefficient and specific heat. An exact solution (for required areas, provided the variation of coefficient with temperature were known, and if an average specific heat could be used) would be possible through graphic integration of the equation:

$$W C \, dt = U \, dA \, (T - t) \qquad (2)$$

where

W = weight of material heated
C = specific heat of material
U = overall coefficient of heat transfer
T = steam temperature
t = liquid temperature

In the use of the log mean temperature difference adiabatic operation is assumed, but this will evidently not be the case when digester temperature is high enough for radiation and convection losses to be appreciable. The coefficient of heat transfer during the warming-up period will be of paramount interest, since it will govern the time necessary to come to cooking temperature. If the log mean is to be used in computations involving this period, information must be available as to the time at which departure from the adiabatic takes place.

For the purpose of this investigation, the object of which was the determination of over-all coefficients from experimental data, the usual heat transfer equation was restated so that it would lend itself to graphical treatment and permit the determination of the period over which adiabatic conditions applied. Rewriting Equation 1 as:

$$\frac{q}{\theta} = W C (t_2 - t_1) = U A \frac{(T - t_2) - (T - t_1)}{2.3 \log \dfrac{(T - t_1)}{(T - t_2)}}$$

since T is constant for a given steam pressure,

$$W C = \frac{U A \theta}{2.3 \log \dfrac{(T - t_1)}{(T - t_2)}}$$

or

$$\theta = \frac{W C}{U A} 2.3 \log \frac{T - t_1}{T - t_2} \qquad (3)$$

t_1 is taken as initial liquid temperature, and t_2 as liquid temperature at time θ, as required by the logarithmic average temperature difference with respect to time. When this equation is plotted with θ as ordinate and $\log (T - t_1)/(T - t_2)$ as abscissa a straight line will result, the slope of which is equal to $(2.3WC)/(UA)$, and which will pass through the origin of the plot. Evaluation of the slope makes possible the calculation of the over-all coefficient. Constancy of coefficient, specific heat, and steam temperature are assumed, as well as adiabatic operation.

Such a plot is shown in Fig. 2, and is typical of those obtained with the equipment employed. An almost perfect straight line relationship exists from point A, the origin, to point B, after which, from point B to point C, the slope increases rapidly. Calculation of the theoretical water film coefficient at point A leads to a value of about 375, while the theoretical film coefficient at point B is about 650. The over-all coefficient is thus far from constant as required by the derivation above. The existence of a line of constant slope can only be explained if the increasing value of the water film coefficient is offset by increasing radiation and convection losses. There is, however, a limit to the value which the over-all coefficient can reach, due to the existence of steam film and metal wall resistances, while radiation and convection losses continue to increase so long as the temperature goes up. The line beyond B is also

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Olympic Hotel, Seattle, Wash., Aug. 20-23, 1940.

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straight but of different slope. Since B occurs at the boiling point of the liquid it is probable that the value of the water film coefficient here becomes that of a boiling liquid. The slope of the line beyond B is then governed by a balance of radiation against the over-all coefficient for a boiling liquid. Since the logarithmic temperature difference does not apply when the fluid changes state, the over-all coefficient cannot be calculated by the use of any method involving logarithmic mean temperature difference once point B is passed, unless correction is made for the liquid vaporized.

A number of over-all coefficients of heat transfer for water in an externally heated digester are here presented, together with coefficients calculated from the data of one alkaline pulp cook.

Apparatus and Procedure

The apparatus employed was a small experimental digester of about two cubic feet capacity. The arrangement of digester, heater, and accessories is shown in Fig. 1. An orifice in the pump discharge line served as a means of measuring rate of flow, and thermometer wells were inserted near the pump intake and at the point where the fluid left the heater. Digester, pump, and circulating lines were heavily insulated.

The heater consisted of a three-foot length of stainless steel pipe, standard one-inch iron pipe size, enclosed in a steam jacket made from standard two-inch iron pipe. Maximum liquid velocity through the heater was 2.1 feet per second at full pump capacity of 46.8 pounds per minute.

The experimental procedure followed consisted simply of taking simultaneous readings of temperature of the liquid at heater entrance and exit at five-minute intervals, while holding steam pressure and rate of liquid flow constant. Condensate from the heater was also weighed over five-minute intervals

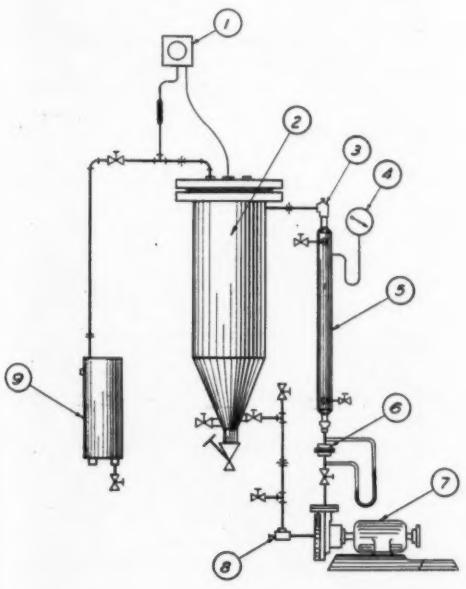

FIG. 1.

Experimental Digester. 1. Temperature and Pressure Recorder. 2. Digester. 3. Thermometer Well. 4. Steam Gage. 5. Heater. 6. Orifice. 7. Motor and Pump. 8. Thermometer Well. 9. Condenser.

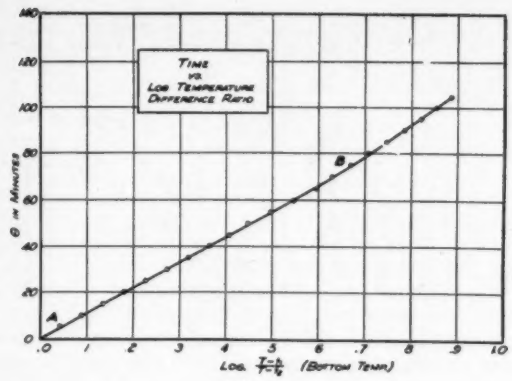

FIG. 2.

to determine the heat input to the digester, principally as a check on radiation losses.

Discussion of Data

Experimental data appear in Table I. Over-all coefficients of heat transfer obtained from these data are shown in Table II, and were calculated in three ways.

TABLE I

Run	Initial Temp., deg. F.	Final Temp., deg. F.	Steam Pressure, lb./sq. in.	Rate of Flow, lb./min.	Weight of Water, pounds
1	75	232	35	10.4	180
2	109	236	40	19.0	190
3	50	238	42	31.5	183
4	84	219	40	31.5	185
5	55	221	41	40.5	188
6	84	229	40	46.8	70

Water equivalent of digester and fittings, 44 pounds.

TABLE II

Run	Rate of flow lb./min.	Mass Velocity lb./sq. ft./sec.	Overall Coefficient U, B.t.u/ hr./sq. ft./deg. F. Based on Slope	Log mean Δt	Theoretical water film	Deviation from U based on theoretical water film %
1	10.4	29.0	203	204	207	— 1.9
2	19.0	52.8	282	284	299	— 5.7
3	31.5	87.5	343	340	370	— 7.3
4	31.5	87.5	341	335	370	— 7.8
5	40.5	112.5	365	364	422	—13.5
6	46.8	130.0	410	414	474	—13.5

For the coefficients in column 4, Θ was plotted versus log $(T - t_1)/(T - t_2)$ for each run and the slope of the resulting line evaluated between points A and B (Fig. 2). The slope was then set equal to $(2.3\ WC)/(UA)$ and the expression solved for U, since W, C, and A were known. At low rates of circulation the temperature readings at the pump suction tended to lag for the first few minutes of operation, due to some time being required for the hot liquid entering the top of the digester to displace the cold liquid there. In such cases the straight line will not pass through the origin of the plot (Fig. 2). In the runs where this took place the line was drawn from the origin to point B, rather than through the plotted points in the vicinity of the origin.

Column 5, Table II, is composed of coefficients based upon log average temperature difference, between zero time and the time corresponding to point B in Fig. 2.

In Column 6, Table II, are over-all coefficients based upon a calculated water film coefficient. The relations employed were:

$$U = \frac{1}{\frac{1}{h_1} + \frac{L}{k}\frac{D_1}{D_{ave}} + \frac{D_1}{D_2 h_2}} \qquad (4)$$

where

U = over-all coefficient B.t.u./hr./sq. ft./deg. F.
h_1 = individual water film coefficient, B.t.u./hr./sq. ft./deg. F.
L = pipe wall thickness, feet
k = thermal conductivity of metal, B.t.u./hr./sq. ft./deg. F./ft.
h_2 = individual steam film coefficient, B.t.u./hr./sq. ft./deg. F., assumed as 2000
D_1 = inside diameter of pipe
D_2 = outside diameter of pipe
D_{ave} = average diameter of pipe

$$h_1 = .0225 \frac{k}{D} \left(\frac{D V}{\mu}\right)^{.8} \left(\frac{C \mu}{k}\right)^{.4} \qquad (5)$$

where

h_1 = individual water film coefficient
k = thermal conductivity of fluid
D = diameter of pipe
V = mass velocity of fluid
μ = viscosity of fluid
C = specific heat of fluid

All of the above are understood to be expressed in consistent units, and the properties of the fluid to be evaluated at mean fluid temperature.

Values of h_1 were calculated for each run by means of Equation 5, and were then substituted in Equation 4, the steam film coefficient having been assumed as 2000.

Good agreement is shown between the measured coefficients and those calculated on the basis of the theoretical film coefficient, particularly at low rates of flow. It is possible that poorer agreement at higher rates is due to flashing in the pump and on the low pressure side of the orifice, resulting in a mixture of liquid and vapor being in contact with the heating surface. If sufficient vapor were present this could cause a blanket of low conductivity at the pipe surface, which would increase the liquid film resistance.

Figure 3 is a plot of over-all coefficient U, both measured and as calculated from the theoretical value of the water film coefficient, versus mass velocity of fluid. Figure 4 represents the same data plotted on logarithmic coordinates, where the straight lines which result show that the two variables are related through an expression of the form: $y = m\,x^{n}$

If the slope of the line representing U based on theoretical film coefficient is determined, the value of n obtained is 0.523, while that for the measured values of U is .388. Were the water film the only thermal resistance, the over-all coefficient would be expected to vary as the 0.8 power of the mass velocity (Equations 4, 5). The lower exponent found is due to the presence of steam film and metal wall resistances, which, while not controlling, yet make up an appreciable part of the total resistance.

Investigation of the coefficients of heat transfer to be expected in actual pulp cooking operations has been begun, but sufficient data have not been collected to warrant an extended report at the present time. In general, except that the value of the coefficient is lower, due to the properties of the fluid heated, the same principles apply as for water. A typical curve for a soda cook is shown in Fig. 5. The time of cooking is divided into three distinct periods, represented on the graph as A to B, B to C, and C to D. The section of the line from A to B terminates at the boiling point of the caustic and covers the time required to heat liquid without change of state. Boiling liquid is being heated from B to C, while at C the over-all coefficient has ceased to increase and the existing temperature difference is just enough to overcome radiation and convention losses until the end of the cook is reached at point D.

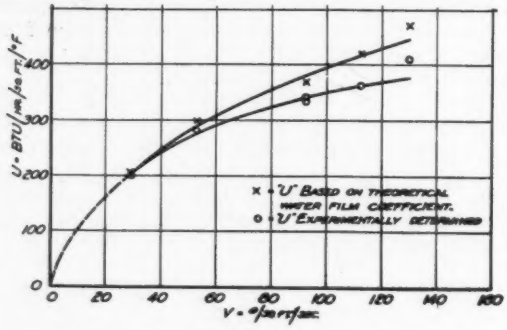

FIG. 3.
Over-all Coefficient "U" vs. Mass Velocity

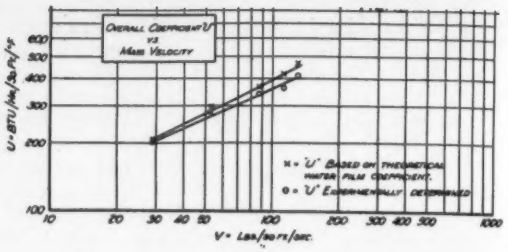
OVERALL COEFFICIENT 'U' VS MASS VELOCITY
U • BTU/hr./sq. ft./°F
V • Lbs./sq. ft./sec.
× = 'U' BASED ON THEORETICAL WATER FILM COEFFICIENT.
○ = 'U' EXPERIMENTALLY DETERMINED

FIG. 4.

Calculation of the over-all coefficients gives values of 304 by the slope of the line, 321 by log mean temperature difference, and 314 by theoretical liquid film coefficient. Fluid properties were taken as those of a sodium hydroxide solution at average fluid temperature.

For temperatures up to the boiling point the logarithmic average temperature difference applies to the indirectly heated digester.

Over-all coefficients of heat transfer for water, when computed from experimental data employing log average temperature difference show a maximum deviation of 13.5% from over-all coefficients calculated on theoretical fluid film coefficients.

In the range of mass velocity studied, the over-all coefficient varies as the 0.388 power of the mass velocity.

Preliminary investigation indicates that heat transfer characteristics similar to those of water will be found when using alkaline cooking liquors.

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(1) Walker, Lewis, McAdams, and Gilliland, 2nd ed. p. 120, New York, McGraw-Hill, 1937.

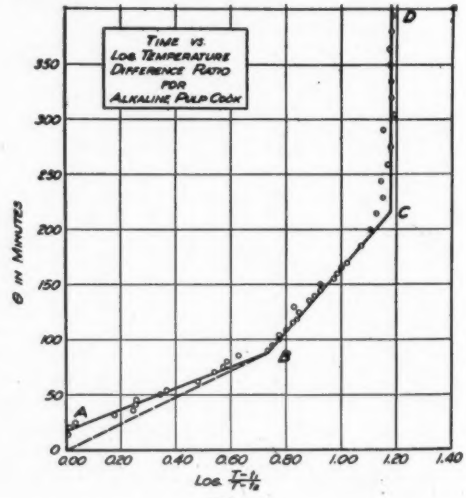

FIG. 5.

Applications of Spectrographic Analysis to Pulp and Paper Problems*

By Philip Nolan[1]

Abstract

A brief discussion of methods and instruments used in both emission and absorption spectra analyses is presented. Possible fields of application of the spectrographic methods to both inorganic and organic analyses of pulp and paper are discussed, and particular applications which have already been made are cited.

Within the last few years enormous strides have been made in the application of spectrographic methods to the problems of industry. This rapid progress is based upon the large amount of work done both in certain academic laboratories and in those industrial laboratories pioneering in the methods of spectroscopic analysis. One of the main forces of progress has been the energy which makers of fine instruments have been expending in the direction of developing accurate and precise spectrographs along with rapid means for the measurement of wavelengths and intensities of spectral lines. The principal leaders in the manufacture of spectrographic equipment have been Bausch & Lomb Optical Company (B. & L.) and Adam Hilger Ltd., in addition to a number of exceptionally active groups such as the Applied Research Laboratories, The Baird Associates, The Gaertner Scientific Corporation, and Central Scientific Company. Real evidence of the intense and growing interest in the field of spectroscopy on the part of industry is the conference on spectroscopy which has been held annually at the Massachusetts Institute of Technology since 1932 *(1 to 3)*. These conferences have served the purpose of integrating the experience of workers in widely divergent industrial fields.

The application to the field of metals has shown greatest promise. This is natural in that analysis by means of spectrographic methods is most unique and is rapidly carried out in this field where analysis is a vital part of plant control. Their experience has been that the main difficulty underlying the analyses has been a reproducibility of spectrograms. The precision of spectrographic analysis has gone so far in the case of metals that it requires real confidence in a carefully controlled analytical determination in the normal chemical sense before such analyses can be trusted for the purpose of checking spectroscopic analyses.

In the field of nonmetals, the analyses have not been generally successful, but that difficulty is inherent in the nature of the spectra emitted by the nonmetals in that the spectra of these elements are difficult to excite and their principal lines lie far in the ultraviolet.

In the field of organic chemistry, there has been accumulated a large body of information with the major emphasis on a strictly empirical approach to the problem of analysis. The success of the application of absorption spectrography to organic analysis is dependent principally on the character of the organic compound. Typical examples of the value of the method of absorption spectroscopy in the field of organic chemistry are the strides made in vitamin research and in the general field of biological chemistry, as well as in the field of strictly organic synthesis. For example, granted that a compound has a unique absorption spectrum, it is quite easy to test the purity of the compound on the basis of the approach of the actual absorption spectrum of the compound to that of the ideally purified compound. It must not be thought, from this discussion, that the spectroscopic method is a panacea for all the ills of analysis, for that is not the case. The spectroscopic method is simply another tool at the command of the chemist and engineer.

In principle, the method of spectroscopic analysis is straightforward. Nearly everyone has had some spectroscopic experience when it is remembered that colorimetric analyses and qualitative analyses have been made by means of flame spectra. To be sure, in certain cases these analyses were not based upon the observation of the spectra but simply by the color of the flame.

General Methods of Spectrographic Analysis

Emission Spectra

There are two general methods used in spectroscopic analysis: the method of emission spectra and that of absorption spectra. In the case of emission spectra, the basic principle is that all elements, when properly excited, emit light characteristic of the element and that the intensity of the light is proportional to the amount of material present. When one speaks of the emission spectrum of a compound, it is assumed that the character of the light emitted by the given compound as analyzed by means of a spectrograph is known. The sole function of a spectrograph is to separate the light emitted by a given element or compound into its individual component wavelengths and at the same time provide a photograph from which a qualitative or quantitative estimate of the relative intensities of these several components may be obtained. Evidently, as far as measurement is concerned, there are two variables which characterize a spectrum line of a given element: the position of the line on the wavelength scale and the intensity or strength of the line. The study of the relation between the wavelengths of the several lines of a given element have led to the subject of atomic, molecular, and nuclear spectra, from which much has been learned as regards the electronic structure of both atoms and molecules. For the purpose of analysis, we are more interested in what lines belong to what elements rather than in the laws underlying the relations between the intensities and wavelengths of the lines of a given spectrum.

Absorption Spectra

In the field of organic analysis, it is found neces-

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Olympic Hotel, Seattle, Wash., Aug. 20-23, 1940.

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sary to study the absorption spectra of the compounds. This spectrum is defined by the curve showing the variation in the amount of light absorbed as a function of the wavelength throughout the range of wavelengths of interest. For example, ultraviolet absorption spectra would include a picture of the variation of the absorption coefficient for the range extending from 200 to 400 mμ, whereas the visible absorption spectra, which are responsible for the colors of materials seen in daily life, are described by the variation of the absorption coefficient from 400 to a little over 700 mμ. The infrared absorption spectra, then, comprise the data on the variation of the absorption coefficient from 750 up to 20,000 or more mμ. To be sure, for the purpose of analysis, one will attempt to choose the spectral range—i.e., ultraviolet, visible, or infrared—suitable for obtaining the most characteristic spectrum of the given element, as well as the most intense spectrum from the point of view of measuring small quantities of material. Here, again, the spectrograph performs the task of separating the wavelengths of the light emitted by a tungsten filament lamp, a mercury arc, a hydrogen arc, or some other source of light, which is passed through a transparent substance, and measurement of the amount of light absorbed by the given material at each wavelength throughout the spectrum is made. The general method employed is one of comparison—i.e., one compares the light transmitted by a given solution with the light transmitted through the same thickness of solvent, thereby making possible a calculation of the amount of light absorbed by the solute, which then characterizes the presence of that solute in the given solvent.

Another spectroscopic method, which will become more valuable as time goes on, is that of fluorescent spectra determination. This is carried on at present from the colorimetric point of view: the color of the fluorescent radiation of given compounds is noted and taken as evidence of the presence or absence of given materials.

Each of the two general methods of emission and absorption spectra may be divided into a qualitative and a quantitative analysis. In the case of emission spectra, the qualitative analysis of a given material consists of exciting the spectrum of the material, obtaining its spectrogram and measuring accurately the wavelengths emitted with a rough estimate of intensity, and then assigning the wavelengths to certain specific elements. This assignment is carried out with the assistance of tables or charts *(4 to 7)*. If the analysis depends upon the accurate assignment of an individual wavelength, then that wavelength must be measured to better than a tenth of an Angstrom unit. In general, however, one uses the existence of several wavelengths characteristic of a given element in order to establish its presence when observing the spectrogram of a compound containing several elements. This technique reduces the rigor necessary in the precision of the determination of wavelengths, and often it suffices to measure the wavelengths by comparison with the aid of a low power magnifier and an accurately ruled wavelength scale. An observer develops a feeling for the characteristic spectra of various elements in a very short time, and this greatly simplifies the task of measurement of spectral lines and the assignment of these lines to certain elements. As a matter of fact, it happens in most cases that very strong and persistent lines of a given element occur at wavelengths not emitted by other elements.

This brings up the question of the lines to be chosen for the identification of a given element. This choice depends roughly upon the amount of the element present in a compound and the efficiency of the excitation of the lines characteristic of that element, as well as freedom from possible superposition of lines of other elements. There are so-called persistent and principal lines quoted in the various tables of lines of the elements. The principal lines are the strongest lines generally associated with the given element and the normal conditions of excitation of its spectrum. On the other hand, the persistent lines are the last lines which appear in spectrograms in which the amount of the element is continuously decreased, and these should be used for trace identification.

In contrast to the method of qualitative analysis, that of quantitative analysis introduces a number of difficulties *(1 to 3, 8 to 14)*. The major difficulties are the precise reproduction of the intensity distribution of the lines characteristic of a given element for duplicate exposures of the same material, and the change of the intensity distribution due to the environment in which the given element finds itself. Consequently, it has been found that the success of a quantitative procedure depends upon discovering an accurately reproducible method of exciting the spectrum and an accurate means of comparing the intensity of certain chosen lines with the intensities of lines of an element whose percentage composition in the compound is easily determined.

Calibration Samples

It will be found, generally, that it is necessary in precise analyses to use samples for calibration whose composition approximates those of the samples of interest. There are several methods used for purposes of calibration with the main objective of obtaining as precise an analysis as possible. Let us consider one of these methods of calibration, the internal standard method, for the analysis of a calcium lime for magnesium, aluminum, silicon, and iron. The procedure consists in making up samples whose percentage composition of aluminum, silicon, iron, and magnesium relative to calcium cover the normal useful range. Spectrograms are obtained from these samples and one line each of aluminum, magnesium, silicon, and iron is chosen in addition to a standard reference line of calcium. The ratios of the intensities of each impurity line relative to the calcium reference line are obtained for each composition, and a curve is plotted of the logarithm of the concentration of the impurity element versus the log of the ratio of the intensity of the impurity line relative to the intensity of the calcium reference line. These points then will permit the construction of four curves, one for each of the impurity elements showing the log ratio of the intensity versus the log concentration. For the unknown sample, it is then only necessary to measure the intensities of the several lines of its spectrum, obtain the log intensity ratios, and read off the concentration of the aluminum, iron, silicon, magnesium, compared with that of calcium (from each of the calibration curves).

Beer's Law

As far as the absorption spectrum analysis is concerned, the qualitative analysis consists mainly of the

recognition of a certain characteristic shape of absorption curve as associated with a given compound. For the purpose of quantitative analysis of a pure compound, the absorption of a known concentration and a known thickness of the solution is determined, and the absorption coefficient per unit weight per unit thickness is calculated *(7, 15 to 18)*. The wavelength of maximum absorption and the maximum absorption coefficient generally constitute the data characterizing a given compound. However, the quotation of the absorption coefficient and the wavelength of maximum absorption are in general not sufficient for the unique analysis of a given compound. It is preferable to have the whole absorption curve available. The fundamental law, which holds in many cases and which is of extreme usefulness in the application of the quantitative method to absorption analysis, is Beer's law. This law is based on the assumption that the absorption coefficient of a given compound is directly proportional to the concentration of the absorbing substance in the mixture. However, the problem of molecular interaction introduces difficulties in the interpretation of absorption spectra in that deviations from Beer's law are observed. There are groups of compounds which change their absorption spectra markedly, depending upon the pH of the solution, the character of the solvent, or the concentration of the solute. On account of this behavior the most successful types of analyses are done on the basis of an empirical approach in which solutions of known compositions, approximating those of interest, are used for purposes of calibrating the instrument to be used in the analysis.

Equipment for Spectroscopy

In order to carry out any of the methods of spectroscopic analysis, it is necessary to have a good deal of equipment. This equipment includes, in general, a spectrograph, a source for exciting the spectra in the case of emission spectrum analysis, a source of continuous radiation or a very dense line spectrum for the purpose of absorption spectra work, photographic plates, processing and developing equipment, a photometer, means for analyzing the plates, including some wavelength measuring device and a microphotometer for measuring the relative intensities of spectral lines, in addition to the personnel necessary to carry out the measurements. As in other means of analysis, the choice of equipment depends upon how precise an analysis one desires to carry out. The choice of equipment also depends upon the need and importance of a given analysis and on the saving in time of personnel. These criteria vary enormously from laboratory to laboratory, and the question of expense of equipment can reasonably be based only on the experience of others in a closely allied field.

Spectrographs

There are two classes of spectrographs, the prism spectrograph and the grating spectrograph. In the prism spectrograph, the several wavelengths of an element are separated because of differences in speed of light of different wavelengths through the prism, whereas the separation in the grating spectrograph is based on the principle of interference. We have had good results in our spectrographic work using a B. & L. medium quartz spectrograph, as well as a model 2700 spectrograph for use in the visible spectrum range. For general purpose use, the large or Littrow model of the quartz spectrograph produced by B. & L. is more convenient than either of the smaller models mentioned above. Owing to progress made in the ruling of gratings, their use in spectrographs is increasing rapidly.

A prism spectrograph consists of a collimating lens for the purpose of providing a parallel beam of light incident on the prism and a second lens which focuses the slit on the photographic plate. After the photographic plate has been exposed to the light transmitted by the lenses and through the prism, one obtains a series of black lines on the photographic plate which are, in reality, images of the slit of the spectrograph as seen in the different wavelengths of light emitted by the source. It is these slit images on photographic plates which are called spectrum lines and which characterize the presence of given wavelengths in the light emitted by a given element. Consequently, one can speak either of the measurement of lines or the measurement of wavelengths (the two expressions are interchangeable) in carrying out the method of spectrographic analysis. The developed photographic plate showing the lines of a given spectrum is called a spectrogram.

Sources of Excitation

There are several principal sources used to excite spectra of given elements and compounds; they include the arc, spark, gas discharge, and the flame. All of the sources used to excite the emission spectra of various compounds are designed for the purpose of transferring electrical or thermal energy to the atoms or molecules present in the sample under analysis; this energy in turn is emitted by the various atoms or molecules and thus gives rise to the spectrum characteristic of the compound. As stated above, the secret of success in the application of the spectrographic method is the proper choice of the source. The criteria for this choice are as follows: first, efficiency of excitation—i.e., for the purpose of demonstrating the presence of very small amounts of material; second, the constancy of excitation, giving rise to the possibility of reproducible spectrograms; third, the ease with which the material may be sampled; fourth, the possibility of using large or small amounts of this material; and fifth, the necessity of measuring the spectra of the materials *in situ* in some equipment or operation. In the case of pulp and paper, it has been our experience that the direct current carbon arc source of excitation satisfies most of our needs. However, we have used the high frequency spark method of excitation where it was desired to excite the spectrum of very small specks. As far as the arc is concerned, there are two possible methods of excitation, one in which the sample is placed in a shallow hole in the positive carbon of the carbon arc; and a second, in which the sample is placed in a reasonably deep hole in the negative carbon or cathode of the carbon arc. The first method of analysis is called the positive crater method; the second the cathode layer or Glimmschicht method of excitation. It has been found that, in the case of the Glimmschicht method, the sensitivity for the determination of traces of certain elements is much higher than that of the positive crater method. However, the positive crater method is of more valid use when the concentration of the materials is rather higher than when it corresponds to traces only. In any case, for use with the arc, it is advisable to have a flexible support for mounting the arc electrodes. We have found the B. & L. arc stand accept-

able. In general, it is desirable either to obtain an arc stand with a hood and means for disposing of arc gases, or to build an adaptor for an open arc stand for the same purpose. There are special arc sources in which the electrodes are caused to rotate, and in many cases these serve for greater uniformity and reproducibility in obtaining spectrograms. In the case of spark excitation, which is so widely used in metal analysis, one requires a transformer, a high voltage condenser, a spark gap, and electrodes of the material to be tested.

Photographic Supplies

In addition to the source and spectrograph, there should be available a photographic dark room handy to the spectrograph. The generally recommended developers for photographic plates should be used, with added attention being paid to the requirements for extremely uniform development, especially in making quantitative analyses. Tank development, using an automatic rocking device, appears to be the best method. There exists a wide choice of plates for spectrographic use, and it is convenient to obtain plates of high sensitivity in any range of the spectrum from the ultraviolet to the near infrared. The choice of contrast of photographic plates depends on the type of spectrogram desired; e.g., a low contrast plate may be used for obtaining a survey covering a wide range of intensities and extremely high contrast and fine grain plates are employed in photometric work in which small differences of intensities are to be measured.

In addition to the above-mentioned equipment, there should be available some type of photometer, such as a sector photometer, a wavelength comparator, and a microphotometer for use with spectral lines, either of the visual or photoelectric type. In general, the determination of the wavelengths of the lines characteristic of a given element or compound is made by a comparison method—i.e., the position on the plate corresponding to lines of known wavelengths such as those present in the iron, copper, or the mercury arc is used to obtain a relation between distance along the photographic plate from a given fiducial mark and wavelengths of known lines. After these data are obtained, the distances on the plate from the fiducial mark are determined for the lines of the spectrum under analysis. From the measured positions, the wavelengths are then determined and subsequently the assignment of wavelengths to a given element may then be started. As mentioned above, for the purposes of qualitative analysis, the wavelength determination is sufficient.

For quantitative analysis it is also necessary to measure the relative intensities of certain chosen lines of a given spectrum. This measurement is made by means of a microphotometer or densitometer, which consists of a device arranged for measuring the amount of light transmitted through the developed image of a given spectrum line. In certain methods of calibration, exposures are included on a given plate in which the intensities falling on successive areas of the plate have been reduced in known fractions. These areas are then photometered. From the measured values of the transmission of these areas the optical density is calculated, which is then plotted against exposure. This plot suffices to calibrate a given plate. The measurement of the intensities of the lines then consists in measuring the optical densities of the developed line images and reading off the composition from the calibration chart corresponding to the observed relative intensity. Another scheme consists of merely plotting the logarithm of the galvanometer deflection for two given lines, a control line and a sample line, and then reading this ratio from a calibration chart giving the log of the ratio of the galvanometer deflection versus the percentage composition of the two elements with which the above lines are associated.

Applications in the Pulp and Paper Industries

As in the case of chemical analysis, the field of spectrographic analysis may be broken into two main divisions: macroanalysis and microanalysis. (References *19 to 21* are general bibliographies which serve to indicate the nature of the application of both the emission and absorption spectra methods.) Under the heading of macroanalysis appear several distinct problems to which the spectrographic method is applicable. A problem which holds promise of results of immediate value to an organization first starting in the field of spectralanalysis is the survey type of analysis in which, for a given sample of paper, pulp, raw material, or sample of processing equipment, a purely qualitative analysis is run by means of spectroscopic methods. This analysis then serves as a guide to the chemist in the performance of his usual quantitative analysis procedures. This type of qualitative survey can be very rapid and most useful from the point of view of saving time of the chemist and includes in the analysis unsuspected elements, which may in some way account for the peculiar character of the sample.

The general problem of impurities in pulp or paper, either of inorganic or organic character, offers a wide field for spectrographic study. The most likely success is to be obtained in the field of inorganic impurities. These can be impurities in the sense that there is a rather high percentage composition of the given metallic elements, or the impurities may be present in amounts corresponding to traces which would be ordinarily overlooked in the usual quantitative or qualitative analysis. Another application of the method is to the analysis of paper and pulp for unusual constituents, as when a pulp or paper has been treated by some novel chemical means, in which case the problem will consist of the analysis for the compound employed. This type of analysis is often carried out most successfully by the process of elimination. Here the spectroscopic method in many cases immediately delimits the problem and shortens remarkably the process of elimination.

In certain cases it is possible, using the method of absorption spectrography, to show the presence of an unusual organic compound. In employing the spectrographic method, one takes advantage of all the usual chemical techniques available in regard to differential solubility, precipitation methods, and the like in order to arrive at compounds and separations which will give greater meaning to the specificity of the spectroscopic analysis.

Applications can be made to the problem of routine quantitative analysis with the average deviation of a single determination of 10% without too much trouble, and within 5% and in special cases as low as 2%, using the best methods available for the analysis. When these methods are carried out in routine fashion, it is possible for one individual to carry out from 15 to 70 quantitative analyses a day for as many

as 12 elements in each determination. The efficiency of the method is increased when analyses are carried out on certain materials in which the composition is generally known to vary within certain limits.

Specks in Paper

In the field of microanalysis as applied to paper, the problem of the determination of the composition of specks in paper arises with the objective of determining the source of the specks from the analysis. Here again the spectral analysis is intended to be a supplementary method to those usual microscopic methods which depend upon certain physical tests as well as reagent or microchemical tests for identification. The method has been carried out in detail for the analysis of the metallic components over a wide class of specks ordinarily found in paper. It was found possible in the study of the spectrographic composition of specks to obtain an analysis on single specks weighing no more than 50 micrograms. This was done using both the cathode layer method and the positive crater method of excitation. The equipment used was a B. & L. Littrow spectrograph and a model 2700 B. & L. spectrograph. In addition to both the cathode layer and the positive crater methods of excitation, a high frequency spark discharge method was used, in which the secondary of a Tesla coil was used to supply the energy to the spark gap between iron electrodes. The sample whose spectrum was to be excited was placed in the gap between the electrodes, and the spark on the average terminated at the sample thereby causing excitation of the spectrum characteristic of the speck.

In addition to the two broad general fields of analysis, there come to mind certain specific problems which are of interest to the pulp and paper industry. First, a study of the purity of pulp used for purposes of regeneration (in which case it is desirable to have the metallic content of certain elements below 10 to 25 p.p.m.), as well as for insulating papers of low ash *(22)*. It is in this case that the spectroscopic method is extremely useful in determining readily small amounts of trace elements present in pulps of this nature. It has been found that the minimum concentration of an element which can be just detected varies markedly with the character of the material which is present and the nature of the spectrum *(23 to 25)*. For most analyses, a weight of sample ranging from one to 10 mg. of ash is sufficient. In certain cases, with favorable ash compositions, it is possible to detect less than two parts in 100,000 with an ash sample weighing one mg. This, of course, corresponds to a detectable amount of element present on the electrode of about 0.02 micrograms. To be sure, this estimate is for the most favorable case whereas in more unfavorable cases the minimum detectable amounts approach 0.05%. However, in most cases in which analysis is used to greatest advantage, the work of Owens indicates the possibility of detecting, on the average, about 5×10^{-5} mg. of metallic elements present on a carbon electrode.

Alkali Analysis

In the analysis of alkali for the rayon industry, Duffendack, Wolfe, and Smith *(12)* report the use of the high voltage alternating current arc with graphite electrodes for the excitation of the spectra of alkalies and mention the design for two sets of equipment for routine use. The range of percentage composition of impurities varied from ten parts per million up to one part per thousand. In this procedure aluminum, calcium, magnesium, silicon, chromium, copper, iron, manganese, nickel, and lead were determined.

One application of interest is the determination of traces of copper present in a paper for which it was desired to hold the copper content of the paper to below one part in 10 million. The spectrographic method for the determination of copper is straightforward and was admirably suited to this problem. Similar determinations include the analyses for iron, aluminum, and boron.

Titanium, etc. Analysis

The method of emission spectra analysis is readily applicable to the analysis of coating compositions as regards their elementary composition. However, it must be emphasized that the question of the determination of inorganic radicals is not satisfactorily handled by means of spectroscopic analysis, but the analysis of small amounts of titanium, zinc, calcium, and barium can be readily carried out in a study of coated paper problems. The same analysis can be applied to the question of filler composition.

As was mentioned previously, the emission spectra method is not applicable to the problem of organic analysis. The use of absorption spectra for purposes of analysis includes such determinations as the amount of lignin residues which are present in a given material, in view of the fact that the absorption spectrum of lignin derivatives is so characteristic and generally independent of the nature of the derivative in which the lignin nucleus is present. There are, however, certain exceptions to this rule, as are pointed out by Glading *(30)*—e.g., methanol lignin absorbs more strongly than a native lignin by about 30%. Even here there is no great change in the characteristic shape of the spectral absorption curve. As little as two mg. of lignin per liter may be detected by the absorption spectrum method. Another application which has been carried out at the Forest Products Laboratory *(26)* is the distinction between the lignin of softwoods and hardwoods on the basis of the difference of about 10 mμ in the wavelengths of maximum absorption of the two types of lignin. There has been no exploitation of the use of ultraviolet absorption spectra for the determination of natural resins or pitch in a given pulp or wood.

In certain cases it is possible by means of studying extracts of papers or pulps to state definitely that certain compounds are present. However, the uniqueness of the solution of the spectral analysis by means of ultraviolet absorption obviously depends upon the shapes and magnitudes of the absorption spectrum of the compounds which are likely to be present. If there is more than one compound present, which is generally the case, then the question of masking or interference of the spectrum of one compound by the presence of a second compound arises. This question is a real one, but in many cases can be handled on the basis that in certain spectral regions the absorption coefficient of one of the components of the mixture is very small and thereby permits an approximation to the composition of the compound. With these data the second approximation can be made, which will give further evidence in a quantitative determination of the presence or absence of a given suspected compound. One excellent example of the use of the ultraviolet absorption spectrum method for analytical purposes is the demonstration

by Forman *(27)* of the existence of vanillin as one of the reaction products of the process of fading of groundwood. Here the absorption spectrum of vanillin has a very characteristic shape, and the absorption spectrum of the isolated crystals, which were suspected of being vanillin, was identical with that of vanillin. These data, in addition to other physical and chemical data, proved beyond a doubt that one of the isolated constituents of the reaction products of the fading was vanillin.

Similarly, in many cases one can study discoloration mechanisms caused either by fading or by atmospheric reaction. It is sometimes possible to construct an absorption spectrum of the compound which must necessarily have been formed as a reaction product in order to account for the absorption spectrum of the discolored sample. The existence of the absorption spectrum of the hypothetical compound then serves as a guide in testing various assumptions as to the possible causes of the discoloration; in our own work this has, in certain cases, led to final solutions of problems.

The choice of wavelength range to be used in an absorption spectrum study is determined by the character of the absorption of the several compounds or components which are likely to be encountered. For example, one is forced either into the ultraviolet or the infrared in studying the absorption spectra of a good many colorless pure organic compounds. It happens that in many cases the ultraviolet absorption spectra of these compounds are sufficiently characteristic to be of real use for analytical purposes. In certain cases there is great similarity between the ultraviolet absorption coefficients of certain compounds, whereas their infrared spectra will differ markedly and consequently may readily be used for purposes of analyses. Two interesting examples of the use of infrared absorption spectra are the following: The cause of the discoloration and loss of physical strength properties of certain drying oils when exposed to light was sought, and it was found by a study of the infrared absorption spectra data that the conjugation of C=C bonds *(28)*, which was characterized by a sharp absorption maximum at 10 mμ, disappeared upon irradiation of the sample, which definitely indicated a rearrangement of double bonds in this particular compound due to the action of light. Another example is the absorption of water by gelatin *(29)*, which was studied by means of the infrared absorption spectrum in the near infrared. On the basis of these data, certain assumptions were made as to the mechanism of the absorption of water by the gelatin. There is the possibility of a similar study being made with regard to the character and method of the absorption of water by cellulose; this should lead to further knowledge of the cellulose-water relationship which is so important in the question of hydration.

Another broad field of extremely useful application of spectroscopic methods is that involving problems of photochemistry. For example, in certain fading reactions it is often desirable to distinguish between the fading caused by certain components of a sheet. Here, of course, a study of the absorption curves in the visible spectrum are often of principal interest, but it will be found in certain cases that more detailed knowledge of the mechanism of the reaction will be found by studies in the ultraviolet. It is possible, by using the spectrograph or monochromator, to isolate certain wavelengths of a given source and use these isolated wavelengths to produce fading of a given sample. If the amount of energy available in each of the isolated wavelength ranges is measured, then it is possible to construct a curve of the spectral efficiency of the production of fading of the given material. A striking example of this application was made in studying the spectral efficiency curve of the fading of groundwood. It was found that the spectral efficiency curve of the fading of groundwood closely parallels the spectral absorption curves of lignin, which, on the basis of general photochemical knowledge, indicates that the lignin was at least associated in the primary act of the photochemical reaction. Then again, on the basis of the spectral efficiency curve or the ultraviolet spectral absorption curve, one can understand the inversions that are observed between the rates of fading produced by normal sunlight and that produced by certain carbon arcs which are designed to approximate sunlight. It is on the basis of a study of the typical ultraviolet absorption characteristics of organic compounds that one can design compositions of coating materials for the purpose of minimizing fading or occurrence of rancidity in certain packaged materials.

Of course, the application of the general method of absorption analysis in ultraviolet absorption spectra to the problems of organic structures are of interest in the determination of the structure of the basic raw materials used in the paper industry. An example of such an application is the further study of the absorption spectrum of lignin compound derivatives which was carried out by Glading *(30)* who found evidence in favor of one of the structures for lignin which was suggested by Freudenberg.

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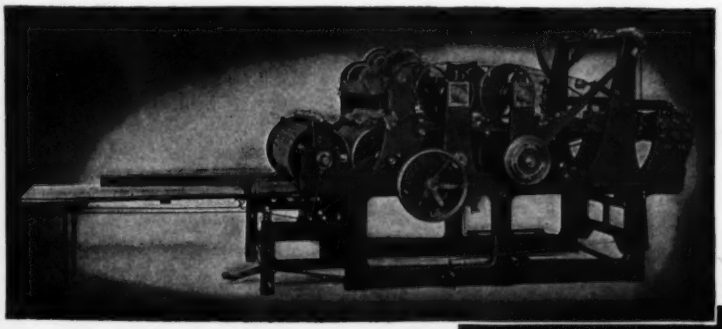

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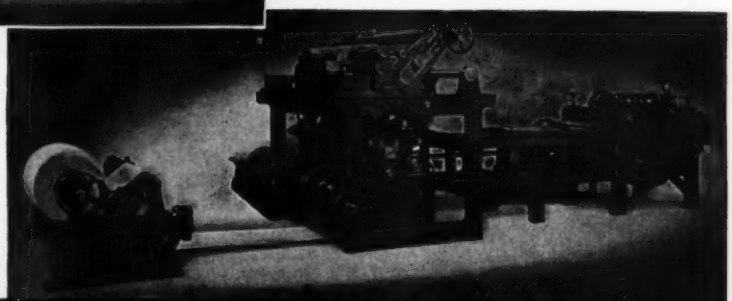

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Effective September 30, 1939, under Treasury Decision 49,970, all publications, exchanges and trade associations, were denied access to import manifests at the New York Customs House. The Paper Trade Journal and other interested parties have vigorously protested this ruling, and as soon as the order of the Treasury Department is modified or rescinded, full publication of all manifests will be resumed in these columns. In the interim, the Paper Trade Journal is making every possible effort to gather all available information from manifests, at various outside sources.

NEW YORK IMPORTS

WEEK ENDING NOVEMBER 9, 1940

SUMMARY

Newsprint ..... 5,556 rolls
Wrapping paper ..... 22 bls.
Tissue paper ..... 443 bbls.
Miscellaneous paper .....1,154 bls.

NEWSPRINT

H. G. Craig Co., Inc., ——, Donnacona, 377 rolls.
——, ——, Liverpool, N. S., 3588 rolls.
H. G. Craig Co., Inc., ——, Donnacona, 358 rolls.
H. Reeve Angel & Co., Inc., ——, Petsamo, 563 rolls.
Jay Madden Corp., ——, Petsamo, 293 rolls.
International Paper Co., ——, Gatineau, 377 rolls.

WRAPPING PAPER

R. L. Stevens, ——, Petsamo, 22 bls.

TISSUE PAPER

Miller, Bryant, Pierce Co., ——, Petsamo, 40 bbls.
Neidich Process Co., ——, Petsamo, 339 bbls.
Old Town Ribbon & Carbon Co., ——, Petsamo, 64 bbls.

MISCELLANEOUS PAPER

D. F. Young, ——, Petsamo, 1154 bls.

RAGS, BAGGING, ETC.

Castle & Overton, Inc., ——, Buenos Aires, 566 bls. bagging.
C. Comiter & Co., ——, Bombay, 350 bls. cotton waste.
Castle & Overton, Inc., ——, Bombay, 70 bls. jute rags.
W. Lowenthal, ——, Havana, 10 bls. rags.

WOOD PULP BOARDS

Jay Madden Corp., ——, Petsamo, 325 bls., 610 rolls.
D. F. Young, ——, Petsamo, 84 bls.

PHILADELPHIA IMPORTS

WEEK ENDING NOVEMBER 9, 1940

Terminal Paper Co., ——, Petsamo, 256 rolls wrapping paper.
E. W. Twitchell Co., ——, Petsamo, 897 rolls wrapping paper.
Universal Paper Bag Co., ——, Petsamo, 48 rolls, wrapping paper.
Wilder Bros., ——, Petsamo, 32 bls. wrapping paper.
Jay Madden Corp., ——, Petsamo, 207 bls. wood pulp boards.

WILMINGTON IMPORTS

WEEK ENDING NOVEMBER 9, 1940

Pulp Sales Corp., ——, Petsamo, 6031 bls. prime strong sulphite, 8950 bls. prime bleached sulphite.

LOS ANGELES IMPORTS

WEEK ENDING NOVEMBER 9, 1940

Pan Pacific Import Co., ——, Yokohama, 4 bls. paper.

PAPER SECTION APPOINTS COMMITTEES

(Continued from page 11)

SAFETY INSTRUCTION CARD COMMITTEE—R. W. Croucher (Chairman), Minnesota and Ontario Paper Company, International Falls, Minn.; Ernest Augustus, The Mead Corporation, Chillicothe, Ohio; G. J. Bienvenu, Gaylord Container Corp., Bogalusa, La.; H. P. Heubner, The Flintkote Company, New York, N. Y.; John M. Lavin, St. Croix Paper Company, Woodland, Maine; C. J. Munk, Racquette River Paper Company, Potsdam, N. Y.; Arthur E. Winslow, Hollingsworth & Whitney Co., Waterville, Maine.

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Japan Imports Pulpwood from Canada

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., November 13, 1940—Imports of wood from Canada by two Japanese firms holding timber concessions there—Nisso Rayon Pulp Company and Canada Lumber Company—amounted during the fiscal year April 1939-March 1940, to 46,500,000 board feet, 95 per cent of the 48,000,000 board feet which had been anticipated. Of this amount, 24,000,000 board feet were imported by the Canada Lumber Company on behalf of Nokuetsu Paper Company for the manufacture of paper pulp, the remaining 22,500,000 board feet by Nisso Rayon Pulp Company, also for the manufacture of pulp.

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METHYL VIOLET BBP CONC.
METHYLENE BLUE BBP

Three straight color types *(not mixtures)* that economically produce desirable newsprint "whites". We invite your color problems.

NATIONAL ANILINE & CHEMICAL COMPANY, INC.
40 Rector Street New York, N. Y.

BOSTON, PROVIDENCE, CHICAGO, PHILADELPHIA, SAN FRANCISCO, CHARLOTTE, GREENSBORO, ATLANTA, CHATTANOOGA, PORTLAND, ORE., TORONTO

Branches and Distributors throughout the World

PAPER DYES

NATIONAL DYES

SONOCO

PAPER MILL CORES

LOW COST —BETTER QUALITY

For all uses that require an extremely tough, strong, durable product, SONOCO has developed the new RHINO non-returnable paper mill core. Exhaustive tests for breaking and crushing strength and all around toughness indicate its superior qualities.

RHINO NON-RETURNABLE

Returnable Cores
Equipped With
BERMICO* Metal Ends

DURO is a standard core of plus-standard quality. Made from our own especially manufactured paper stock. DURO cores are made standard 3⅛" I. D. These cores are equipped with BERMICO open or closed notch, metal ends to fit 3" shaft. TAYLOR Ends that protect inside of core only, can also be specified.

EN-DURO a super-quality core to meet extra demands for strength and service where needed. This is our highest grade core. All cores will take either BERMICO or TAYLOR Ends which can be furnished lacquered in various colors for easy identification... Both DURO and EN-DURO cores have a thick kraft surface cover.

Exclusive distributors
BERMICO (Reg. Trade Mark) ENDS *and* BERMICO (Reg. Trade Mark) FIBRE CORES

Strong cellulose fibres are formed into a homogeneous tube and then especially treated to resist all weather and moisture changes. The Bermico Core is light in weight and extremely hard, strong, rugged. These particular cores have exceptionally long life in either returnable or mill roll service.

*(Reg. Trade Mark)

SONOCO MAKES *EVERYTHING* IN *PAPER CARRIERS*

SONOCO PRODUCTS COMPANY

BRANTFORD ONT. HARTSVILLE S. C. MYSTIC CONN.

SHIPPING POINTS: LOWELL, MASS. HARTSVILLE, S. C.

DEPENDABLE SOURCE OF SUPPLY

sonoco

New York Paper and Pulp Market Review

Paper and Pulp Prices Continue Unchanged With Trading Moderate—Kraft Paper Continues Active—No. 2 Roofing Rags Up This Week In Strong Market—Paper Stock Prices Firm and Unchanged.

Office of the PAPER TRADE JOURNAL,
Wednesday, November 13, 1940.

Indications of a rising trend in demand for paper is reflected in reports received from many manufacturers' representatives, jobbers, and general paper merchants during the current week. Improvement in sales volume is limited, however, to a few lines at this date. Prospects are good and as general business activity in practically all parts of the country is slowly advancing, demand for paper and paper products is expected to rise substantially in the future.

The index of general business activity rose to 109.7 per cent for the week ended November 2, from 109.4 per cent for the preceding week.

Paper production for the week ended November 2 was estimated at 89.3 per cent, compared with 98.0 per cent for 1939, with 82.4 per cent for 1938, with 65.3 per cent for 1937, and with 87.0 per cent for the corresponding week for 1936.

Paper board production for the week ended November 2 was 80.0 per cent, compared with 84.0 per cent for 1939, with 68.0 per cent for 1938, with 56.0 per cent for 1937, and with 79.0 per cent for the corresponding week for 1936.

Current demand for paper, other than newsprint, is below trade expectations, with the exception of kraft wrapping paper. Although demand for kraft paper started later this year than is normally regarded as seasonal, production and shipments are now at a relatively high level. More activity in paper board is also indicated in reports received from some quarters in the trade.

According to an authoritative source, September was the first month in 1940 in which the production of paper declined below 1939. The average production ratio for September was 83.3 per cent, compared with 87.3 per cent for August and with 88.7 per cent for September 1939. Orders for September were 82.8 per cent of capacity. Mill inventories showed a slight increase in August and September but are reported below the level of the second quarter of the current year.

Production on printing papers for September, 1940, compared with September, 1939, showed a decline of 7.5 per cent; fine papers, 11.2 per cent; wrapping papers, 8.8 per cent, and miscellaneous papers, 5.7 per cent. Total decline for all groups was 8.6 per cent.

Exports of all kinds of paper for September, 1940 totaled 41,122 tons, valued at $4,607,962, compared with 21,590 tons, valued at $2,662,901 for September, 1939.

Imports of all kinds of paper for September, 1940, totaled 242,527 tons, valued at $11,203,684, compared with 256,168 tons, valued at $12,018,876 for September, 1939.

Prices on all kinds of paper and paper board are fairly firm. Reports indicate some price reductions below representative quoted market prices but the wholesale market, as a whole, is relatively stable. No important price changes have been reported at this date.

Mechanical Pulp

Demand for mechanical pulp is reported only fair this week. This market is rather soft with prices holding unchanged at from $40 to $42 per ton. Domestic production for September was 80,390 tons, compared with 87,310 tons for August, 1940.

Chemical Pulp

Chemical pulp prices hold unchanged with reports of shortage in unbleached sulphite more acute. Production of bleached sulphite for September was 122,354 tons, compared with 139,801 tons for August and with 130,988 tons for July, 1940. Production of unbleached sulphite for September totaled 75,547 tons, compared with 83,469 tons for August, and with 77,358 tons for July, 1940.

Production of unbleached sulphate for September was 245,963 tons, compared with 266,148 tons for August and with 251,188 tons for July, 1940. Production of bleached sulphate totaled 48,146 tons for September, compared with 48,327 tons for August, and with 44,327 tons for July, 1940.

Total imports of wood pulp for the nine months of 1940, included 153,613 tons of mechanical pulp, were 1,985,284 tons, valued at $47,715,384, compared with 1,302,725 tons, valued at $49,490,858 for the nine months of 1939.

Total exports of all grades of wood pulp, including rayon and special chemical grades, for the nine months of 1940, totaled 371,428 tons, valued at $22,534,626, compared with 78,360 tons, valued at $3,632,711 for the nine months of 1939.

Rags

New cotton rags are reported in moderate demand this week, with roofing rags strong. Prices continue unchanged, with the exception of No. 2 roofing rags which advanced this week and are currently quoted at from 1.00 to 1.05.

Old Rope and Bagging

Mill demand for old Manila rope is reported good. Prices continue unchanged with trading active on No. 1 domestic Manila rope at 4.75.

More firmness is reported in old bagging at this date, due to limited supplies. Prices continue unchanged.

Old Waste Paper

The paper stock market is more firm this week. No important change in prices has been reported at this date.

Twine

A little more activity is reported in some grades of twine this week in conformity with the normal seasonal rise in activity in preparation for the Christmas holiday trade. Prices continue unchanged.

More than just a

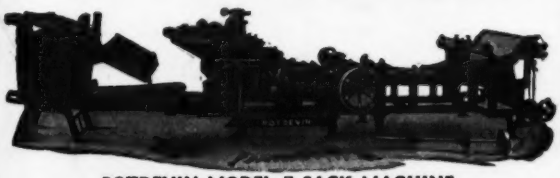
EXCELSIOR KNOX Woolen Co. Camden, Me. FELTS & JACKETS

TRADE MARK

BUT also a guarantee by men who for 75 years have prided themselves in making finer felts. TO YOU —this is the mark of dependability, longer felt life and greater saving.

KNOX WOOLEN CO.
CAMDEN, MAINE.

HEAVY-DUTY **SACKS**



POTDEVIN MODEL 5 SACK MACHINE

for rock-wool, cement, lime, coal, charcoal and other materials that require heavy, 1- to 6-wall kraft sacks . . . can be handled easily on POTDEVIN sack machines.

POTDEVIN sack machines cover a range of bag sizes from 3⅜" x 5¾" up to 30" x 55".

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A Carefulness That Is Microscopic

Many distinct microscopic operations go into our routine in order to assure the quality of the wire we make and the quality of the paper you make. These are in addition to the frequent use of the microscope in phase after phase of research. Over and over again, too, the micrometer does its bit in the interest of accuracy and uniformity. Thus you see, from beginning to end, the minute care that watches over every act in the processing of Lindsay wires. Such are the standards of quality which have been steadily maintained and steadily raised at Lindsay since the company was founded thirty-seven years ago.

THE LINDSAY WIRE WEAVING CO.
Serving the Paper Industry Since 1903
14003-14299 ASPINWALL AVENUE • CLEVELAND, OHIO

Lindsay **WIRES**
FOR PAPER MILLS

Trifles Make Perfection But Perfection Is No Trifle

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, November 13, 1940.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $35 per ton, in barrels, at works; the powder is currently quoted at $50 per ton, f.o.b., works. Demand reported moderate for the week.

BLEACHING POWDER—Quotations on bleaching powder are firm. Demand reported moderate for the week. Bleaching powder is currently quoted at $2 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are firm, with prices little changed for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at from 11 to 13 cents per pound; 80-100 mesh, at from 11½ to 13½ cents per pound. All prices in bags, car lots. Argentina casein, 20-30 mesh, is currently offered at from 11½ to 12 cents per pound. No quotations on French casein.

CAUSTIC SODA—Quotations on caustic soda are firm and continue unchanged at prevailing market prices. Shipments reported steady. Solid caustic soda is currently quoted at $2.30 per 100-pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Prices on china clay are firm and conform to prevailing market levels. Demand reported moderate at this date. Domestic filler clay is currently quoted at from $7 to $15 per ton; coating clay at from $11 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Demand reported good for the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with prices higher. "G" gum rosin is currently quoted at from $1.87 to $1.88 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at from $1.89 to $1.93 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at from $2.55 to $2.56, f.o.b., works.

SALT CAKE—Prices on salt cake are firm and nominal. Demand good. Domestic salt cake is currently quoted at $17 per ton, in bulk; chrome cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $20 per ton on imported salt cake is nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported moderate for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are firm and are a little higher for the current week. Pearl is currently quoted at $2.95 per 100 pounds; powdered starch at $3.05 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported steady for the current week. The commercial grades are currently quoted at $1.15; iron free at $1.60 per 100 pounds. All prices in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $19 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. Quotations on imported talc are nominal.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00		—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.25	@	$5.75
Superstandard	4.87½	"	5.25
Northern Standard Wrapping	4.37½	"	4.62½
Standard Wrapping	4.25	"	—
Tissues—Per Ream—Carlots			
White No. 1	.97½	"	—
White No. 1 M. G.	.95	"	—
White No. 1½	.80	"	—
White No. 2	.75	"	—
Anti-Tarnish M. G.	.80	"	—
Colored	.85	"	—
Kraft	.87½	"	—
Manila	.77½	"	—
Unbl. Toilet, 1 M.	3.75	"	—
Bleached Toilet	5.26	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.10	"	—
Bleached, Jr.	3.60	"	—
Manila—per cwt.—C. l. l. a.			
No. 1 Jute	8.25	@	10.25
No. 1 Manila Wrapping, 35 lb.	5.25	"	—
No. 2 Manila Wrapping, 35 lb.	5.00	"	—
Boards, per ton—			
News	35.00	@	40.00
Chip	35.00	"	40.00
Sgl. Mia. LL Chip	55.00	"	57.00
White Pat. Coated	67.00	"	70.00
Kraft Liners	55.00	"	—
Binders Boards	73.00	"	80.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1.	$39.10	@$46.00	$40.25	@$47.25
100% Rag	31.05	" 36.50	32.20	" 37.75
85% Rag	....	"	29.90	" 35.00
75% Rag	23.60	" 27.75	24.75	" 29.00
65% Rag	....	"	21.65	" 26.25
50% Rag	17.55	" 21.50	18.70	" 22.75
25% Rag	14.65	" 17.75	15.80	" 19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$9.35	@$11.50	$11.55	@$12.75
No. 2	8.50	" 10.25	9.65	" 11.75
No. 3	8.05	" 9.25	9.20	" 11.25
No. 4	7.70	" 9.50	8.90	" 10.75

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper.

Delivered in Zone 1

No. 1 Glossy Coated	$11.90	@	$13.50
No. 2 Glossy Coated	10.35	"	11.75
No. 3 Glossy Coated	9.55	"	11.00
No. 4 Glossy Coated	9.15	"	10.50
No. 1 Antique (watermarked)	9.05	"	$10.50
No. 2 Offset	8.40	"	9.75
A Grade E. F.	8.20	"	9.50
A Grade S. & S. C.	8.45	"	9.75
B Grade E. F.	7.65	"	8.75
B Grade S. & S. C.	7.90	"	9.00
C Grade E. F.	7.35	"	8.50
C Grade S. & S. C.	7.60	"	8.75
D Grade E. F.	7.10	"	8.25
D Grade S. & S. C.	7.35	"	8.50

Ivory & India at $.50 cwt. extra

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	No prices		
Dry	No prices		
(Delivered)			
No. 1 Domestic and Canadian	40.00	@	42.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.72½	@	3.87½
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	3.75
Strong Unbleached Sulphite	3.17½	"	3.75
News Grade, delivered			
Unbleached Sulphite	58.00	"	61.50
(On Dock, Atlantic Ports)			
Kraft Bleached	4.12½	"	
Kraft Light & Strong	3.50	"	3.75
Kraft No. 1	3.40	"	3.60
(F. o. b. Pulp Mill)			
Kraft Domestic and Canadian	2.75	"	3.37½
(Delivered)			
Soda Bleached	3.30	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.

Shirt Cuttings—			
New White, No. 1.	6.50	@	6.75
Silesias No. 1	4.50	"	4.65
New Unbleached	6.50	"	6.75
Blue Overall	4.35	"	4.50
Fancy	3.25	"	3.50
Washables	2.00	"	2.15
Mixed Khaki Cuttings	2.75	"	3.00
O. D. Khaki Cuttings	3.00	"	3.15

Old Rags

White, No. 1—			
Repacked	3.50	"	3.65
Miscellaneous	2.75	"	3.00
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	1.50	"	1.60
Miscellaneous	1.10	"	1.25
Roofing Rags—			
No. 1	1.00	"	1.10
No. 2	1.00	"	1.05
No. 3 (bagging)	.90	"	1.00
No. 4	.60	"	.65
No. 5A	.60	"	.65

Foreign Rags

All prices nominal

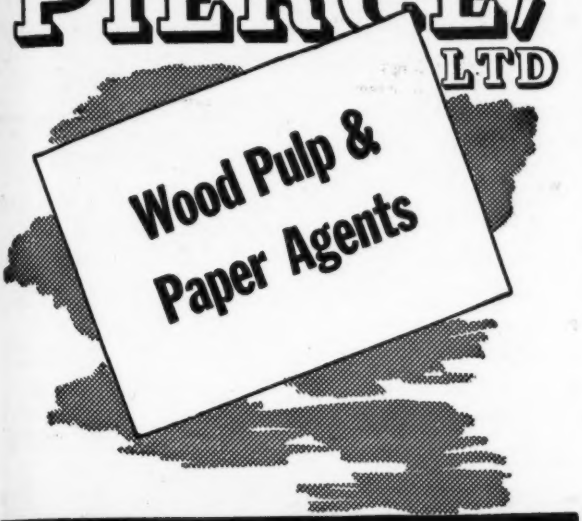
New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxford	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

PRICE & PIERCE, LTD



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West Virginia Pulp and Paper Company

230 Park Ave. New York
35 East Wacker Drive Chicago
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Manufacturers of
ENGLISH FINISH SUPERCALENDERED
MACHINE FINISHED BOOK
and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Eggshell, Cover and Music Papers, Index Bristol, Post Card and Label Papers

HIGH GRADE COATED BOOK

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KRAFT WRAPPING AND KRAFT ENVELOPE
KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

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Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Cass, West Virginia
Charleston, South Carolina

THE DRAPER FELTS

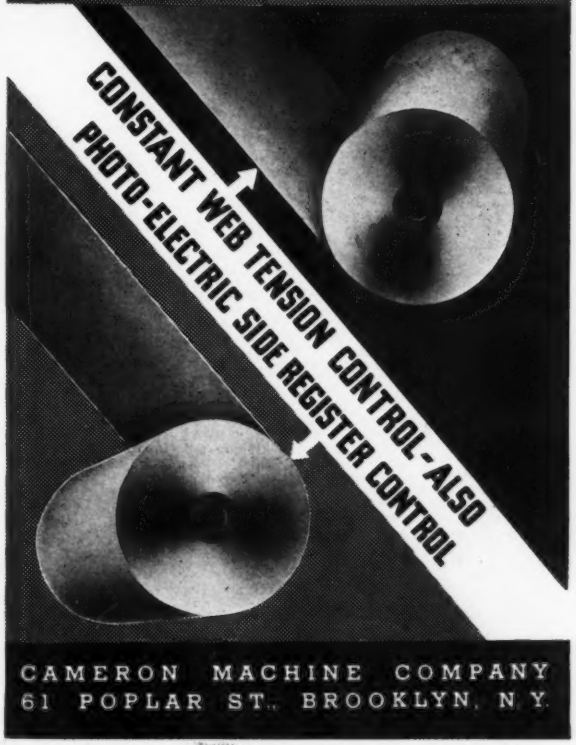
All kinds and styles of Felts for all kinds and styles of Papers.

Write us about your Felt problems and let us help you reduce your Felt Costs—we will call anywhere at any time.

DRAPER BROS. COMPANY
CANTON, MASS.

Woolen manufacturers since 1856

CAMACHINE



CAMERON MACHINE COMPANY
61 POPLAR ST. BROOKLYN, N.Y.

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o .b. N. Y.)

Gunny No. 1—			
Foreign	2.75	@	3.00
Domestic	2.50	"	2.75
Wool Tares, light...	2.00	"	2.25
Wool Tares, heavy..	2.12½	"	2.25
Bright Bagging	2.25	"	2.50
Manila Rope—			
Foreign	4.75	"	5.00
Domestic	4.50	"	4.75
Jute Threads.....	2.62½	"	2.75
Sisal Strings.....	2.10	"	2.35
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.10	@	3.25
Ordinary Hard White No. 1....	2.25	"	2.50
Soft White No. 1..	1.80	"	1.90
Soft White Extra..	2.50	"	2.60
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag.....	.90	"	1.00
Solid Flat Book...	.80	"	.85
Crumbled No. 1...	.70	"	.75
Ledger White Stock.	1.70	"	1.75
Ledger Stock Colored	1.30	"	1.40
Manila—			
New Env. Cut....	1.70	"	1.80
New Cuttings.....	1.30	"	1.40
Old Kraft Machine Compressed bales..	1.35	"	1.50
News—			
No. 1 White News	1.75	"	1.90
Strictly Overissue.	.70	"	.75
Strictly Folded....	.45	"	.55
Corrugated	.65	"	.67½
No. 1 Mixed Paper..	.32½	"	.35

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.18	@	—
White Hemp.....	.18	"	—
Fine Polished—			
Fine India.....	.22	"	—
Unpolished—			
Box	.16	"	—
Paper Makers.....	.13	"	—
Tube Rope.....	.14¾	"	—
Wall Paper.....	.16	"	—
Wrapping	.16	"	—
Soft Fiber Rope...	.14	"	—
Cotton	.24	"	—

(Hard Fiber)

Medium Java.....	.10	"	—
Mex. Sisal.....	.09½	"	—
Manila	.23	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f.o.b. Phila.)

Shirt Cuttings—			
New White No. 1.	.06½	@	.07
New White No. 2.	.03½	"	.04
Light Silesias.....	—	"	.04½
Silesias, No. 1....	—	"	.04
Black Silesias, soft	—	"	.03
New Unbleached...	.06	"	.06¼
Washable Prints...	.02¼	"	.02½
Washable, No. 1..	—	"	.01½
Blue Overall.....	.04	"	.04½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales....	—	"	.03
New Black Soft...	.02½	"	.02¾
New Light Seconds	—	"	.04
New Dark Seconds	—	"	1.50
Khaki Cuttings—			
No. 1 O. D.....	.03½	"	.03¾
No. 2 Mixed.....	.01¾	"	.02
Corduroy	.01¾	"	.01½
New Canvas.....	.04½	"	.05
New Black Mixed.	—	"	.02¼

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	"	3.00
Thirds and Blues—			
Miscellaneous	1.35	"	1.50
Repacked	1.55	"	1.65
Black Stockings (Export)	3.50	"	4.00
Roofing Stock—			
Foreign No. 1....Nominal			
Domestic No. 1...	1.10	"	1.15
Domestic No. 2...	.95	"	1.00
Roofing Bagging..	.85	"	.90

Bagging

(f.o.b. Phila.)

Gunny, No. 1—			
Foreign .....Nominal			
Domestic	2.25	@	2.50
Manila Rope.....	—	"	4.75
Sisal Rope.....	1.75	"	2.00
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	2.25	"	2.50
No. 2.....	—	"	1.50
Wool Tares, heavy..	3.50	"	3.70
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	2.00	"	2.25

Old Papers

(f.o.b. Phila.)

Shavings—			
No. 1 Hard White	2.40	@	2.50
No. 2 Hard White	2.10	"	2.15
No. 1 Soft White	2.00	"	2.10
No. 2 Soft White	1.60	"	1.75
No. 1 Mixed.....	.90	"	1.00
Solid Ledger Stock..	1.90	"	2.00
Ledger Stock, white.	1.65	"	1.70
Ledger Stock, colored	1.10	"	1.15
No. 1 Books, heavy..	.80	"	.85
Manila Cuttings.....	1.75	"	1.80
Print Manila.....	.50	"	.55
Container Manila....	.45	"	.50
Kraft Paper.....	1.35	"	1.40
No. 1 Mixed Paper..	.40	"	.45
Straw Board Chip...	.40	"	.45
Binders Board Chip..	.40	"	.45
Corrugated Board...	.60	"	.65
Overissue News.....	.70	"	.75
Old Newspapers.....	.50	"	.55

BOSTON

Old Papers

(f.o.b. Boston)

Shavings—			
No. 1 Hard White	2.75	@	3.00
No. 1 Soft White	2.00	"	2.25
No. 2 Mixed.....	.75	"	.80
Solid Ledger Books..	1.50	"	1.75
Overissue Ledger Stock	1.75	"	2.00
Mixed Ledgers.....	1.50	"	1.75
No. 1 Heavy Books	1.10	"	1.20
No. 1 Books, Light..	.75	"	.85
Crumpled Stitchless Book Stock.....	.75	"	.85
Manila Env. Cuttings	1.85	"	2.00
Manila Envelope Cuttings extra quality	2.35	"	2.60
White Blank News..	1.40	@	1.50
No. 1 Kraft.....	1.25	"	1.30
Extra No. 1 Kraft...	1.00	"	1.65
Mixed Papers.....			
Print Manila.....	.55	"	.60
Container Manila...	.60	"	.70
Old Newspapers.....	.50	"	.55
Paper Wool Strings.	.95	"	1.10
Overissue News.....	1.00	"	1.10
Box Board Chips....	.40	"	.45
Corrugated Boxes...	.60	"	.65
Kraft Corrugated Boxes	1.00	"	1.05
New Kraft Corrugated Cuttings	1.45	"	1.60
Screening Wrappers.	.70	"	.80

Bagging

(f.o.b. Boston)

Gunny Bagging—			
Foreign	2.60	"	—
Domestic	2.25	"	2.40
Sisal Rope.....	2.25	"	2.50
Mixed Rope.....	.85	"	1.00
Transmission Rope—			
Foreign	—	"	2.40
Domestic	2.00	"	2.25
Soft Jute Rope.....	3.25	"	3.50
Manila Rope—			
Foreign .....(nominal)			
Domestic	4.75	"	5.00
Jute Carpet Threads	2.00	"	2.25
Bleachery Burlap....	4.00	"	3.25
Scrap Burlap—			
Foreign	2.35	"	2.50
Domestic	2.15	"	2.35
Scrap Sisal.....	2.25	"	2.50
Scrap Sisal for Shredding	2.30	"	2.65
Wool Tares—			
Foreign, Heavy...	2.25	"	2.40
Domestic	2.40	"	2.50
Aust. Wool Pouches.	2.75	"	3.00
New Burlap Cuttings	3.75	"	4.00
Heavy baling bagging	2.25	"	2.40
Paper Mill Bagging..	1.75	"	2.00
No. 2 Bagging.....	.75	"	.80

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.04	"	.04¼
New White No. 1.	.07	"	.07¾
New Light Flannelettes	.05	"	.05¼
Canton Flannel, Bleached	.07	"	—
Underwear Cutters, Bleached	—	"	.07
Silesias No. 1	.05	"	—
New Black Silesias..	3.00	"	3.25
Red Cotton Cuttings	.04	"	.05
Soft Unbleached...	.07	"	.07½
Blue Cheviots.....	.05	"	.05½
Fancy	.02	"	.02½
Washable	.02	"	.02½
Cottons—According to Grades—			
Blue Overalls.....	.04¾	"	.05
New Black, Soft..	.03	"	.03¼
Khaki Cuttings....	.02½	"	.03
O. D. Khaki.....	.02½	"	.03¼
Corduroy	.02¾	"	.04
New Canvas.....	.06¾	"	.07¼
B. V. D. Cuttings...	.07	"	.07½

Domestic Rags (Old)

(F. o.b. Boston)

White No. 1—			
Repacked	2.75	"	3.75
Miscellaneous	2.40	"	2.60
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	1.50	"	2.00
Old Blue Overalls ..	1.60	"	2.00
Thirds and Blues—			
Repacked	—	"	1.25
Miscellaneous	—	"	1.00
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.10	"	1.35
No. 2.....	—	"	.77½
No. 3.....	—	"	.67½

Foreign Rags

(F. o. b. Boston)

Canvas	.04¼	@	—
Dark Cottons.....	(nominal)		
Dutch Blues.....	(nominal)		
New Checks and Blues	(nominal)		
Old Fustians.....	(nominal)		
Old Linsey Garments.	(nominal)		
New Silesias.....	(nominal)		

CHICAGO

Waste Paper

(f.o.b. Chicago)

Shavings—			
No. 1 White Envelope cuttings....	3.15	@	—
No. 1 Hard White	2.50	"	2.65
No. 1 Soft White.	2.00	"	2.20
Ledger and Writings	.85	"	.95
Solid Books.....	.95	"	1.10
Blanks	1.50	"	1.60
Krafts	1.40	"	1.50
New Kraft Cuts.....	1.60	"	1.75
Overissue News.....	1.00	"	1.10
Old Newspapers—			
No. 1 Folded News	.70	"	.80
No. 1 Mixed Paper	.40	"	.50
Roofing Stocks—			
No. 1.....	.95	@	1.00
No. 2.....	.85	"	.90

Photoswitch Electronic Level Control

Photoswitch Electronic Level Control Type P30 makes available to industry a simple electronic relay for level control of both conductive and non-conductive fluids and powders. Equipment is available to meet all specifications including single level control, on and off control at two levels, boiler feedwater control, and tank condensate signals. Installation merely entails attaching a probe fitting to the surface of the tank. Since the equipment includes no mechanical parts, and has an unlimited life, it is replacing more complicated float switches.

For two-level control, Photoswitch probe fittings or electrodes are attached to the tank at levels representing the low point where pumping starts and the high level where pumping stops. These probes are wired to the Electronic Level Control. When the liquid level falls below the lower probe, Level Control closes the circuit which starts the pump, and the tank fills. When the Level rises to the upper probe, the fluid itself acts as a conductor of the small amount of current required for the operation of the Level Control.

This opens the pump control circuit.

Even when used with non-conductive fluids the probe circuit carries only milliamperes of current and low voltage. For this reason, Type P30 is used with combustibles. Liquid Level Control Type P30 is recommended in connection with all conductive fluids as well as such insulators as: resin, rubber, latex, paraffin, mica, glass, cement, linseed oil, shellac, mineral oil, wax, waterglass, lacquer, and thinner. Special tank fittings are available for use in corrosive liquids.